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ADDRESSES AND ORIGINAL ARTICLES

MACHAON, OR THE FUTURE OF SURGERY*

BY GEOFFREY KEYNES, M.D. Camb., F.R.C.S. Eng.
ASSISTANT SURGEON, ST. BARTHOLOMEW'S HOSPITAL

SOME twelve years ago, while reading Parker's short "History of Surgery in Great Britain," I was struck by the immensely important part that war had played in the development of the craft of surgery. The god-like Machaon, son of Æsculapius, was the first military surgeon who has found a place in literature, his services to the Greek army during the Trojan wars having been celebrated by Homer in the Iliad. Since Machaon's time other surgeons have played their important parts in the unrecorded history of the innumerable conflicts with which humanity has punctuated its progress through the ages, and in historic times a surprising number of the great names in surgery are discovered to have been those of individuals who for a greater or lesser part of their careers were serving the armies of their countries.

Surgery and War

It is unnecessary to enter upon a list of all early military surgeons. Ambrose Paré, taken as the type, was one of the greatest surgeons of all time, and almost the only great surgeon of the sixteenth century, created a revolution in the practice of military surgery. The scales of orthodoxy fell from his eyes when he saw that the condition of the wounded soldiers who had been treated by the surgeons was on the whole worse than those who had not been treated at all. He accordingly abolished the fashionable boiling oil dressing and substituted dry dressings. He reintroduced the use of the ligature instead of the cautery for hæmostasis in amputation. He invented the use of the artery forceps as an aid to the application of the ligature. Paré's great text-book of surgery was translated into several European languages, and was a standard work for the greater part of the seventeenth century. Meanwhile in this country, Woodall, as the result of experience on the field of battle, invented in the early part of the seventeenth century the modern trephine with its centre-bit, and Wiseman, serving with the Cavalier armies during the Civil war, gained the wide experience which enabled him to write his classical "Chirurgical Treatise," published in 1676. Wiseman was the last of the great English surgeons to be trained in war, but in his writings he had laid the foundations on which solid progress could be built. The surgeons of the Napoleonic wars, the Peninsular war, and the Crimean war all added their contributions. Larrey introduced the plaster bandage and the many-tail bandage. Guthrie used the straight splint for fracture of the femur, and practised ligature of both ends of large arteries at the site of injury. Gamgee popularised absorbent and antiseptic dressings. Spencer Wells invented the hæmostatic forceps which bears his name and first used it in the Crimea. During the latter part of the nineteenth century war played a less conspicuous part in the development of surgery, but this brief catalogue of names will help to strengthen the thesis with which I opened my remarks.

The reason why war has exercised so great an influence on the craft of surgery is very plain to see. The earlier surgeons were necessarily occupied largely with the surgery of injuries, with repairing the damage done by arrows, spears, and slings, with amputating limbs, with the treatment of lacerated wounds, and with relieving depressed fractures of the skull. Until the advent of anæsthetics and asepsis, surgery had but small application in civilian practice, and consequently the military surgeons were in the ascendant, and the lines of their advance were limited to those prescribed by the necessities of war.

It is perhaps depressing to reflect that the advance of surgery, the noblest of the crafts, has been so intimately related to the most vicious and cruel of mankind's activities—namely, his desire to destroy his fellow creatures. But it is consoling to realise that the two greatest advances of all, anæsthetics and asepsis, owed nothing to the stimulus of war. Nevertheless it seems to be true to say that the future course of surgery will be largely shaped by events that have only recently taken place, for the reverberations of the greatest war of all have scarcely begun to die down in the world of surgery. I have purposely, therefore, not included the Great War in reviewing the past, for while it adds strength to my thesis it belongs in a surgical sense to the future. We can still hardly guess what will be the ultimate effect on surgery of the million tragedies enacted on the battlefields of France and Flanders. Possibly the surgical millennium will be attained without the necessity for such another cataclysm to stimulate the brains and hands of surgeons to advance their craft, the momentum given by the Great War being sufficient to carry surgery along for many years yet, particularly on certain lines presently to be considered.

Also it seems unlikely that the surgery of injuries, especially of fractures, will soon fall into the background of knowledge. Ever since the war the motor-car has provided a continually increasing number of victims on whom the surgeon may practise his skill, until the number of casualties occurring every year in a large country such as the United States of America exceeds those of any lesser war. These casualties are so scattered that they do not provide the opportunity for mass experience such as results from the organised treatment of the wounded during war, but at least they keep the lamp of knowledge alight—and this is the only crumb of comfort that we can derive from contemplation of what newspapers call "the toll of the road."

The Modern Development of Surgery

Modern surgery has become a technical process so refined in comparison with the rough-and-ready carpentry of our predecessors that some of its practitioners seem inclined to exalt it almost to the position of one of the fine arts. But although the practice of surgery demands the exercise of judgment as much as of skill and a full appreciation of human relationships, yet it contains in it nothing creative, and it remains the noblest of the crafts. Many surgeons are, indeed, in love with surgery, and some seem to feel almost like high-priests officiating at a sacrificial altar. But it is necessary to remember also the feelings of the victims. Very few patients love surgery; all of them, in fact, except a few with psychological abnormalities, hate surgery, and many do not scruple to say so, however grateful they may feel for the benefits they have received. To all but the most educated minds, surgery is only another name for a "cutting operation," and that is a thing

* An address delivered to the Royal Medical Society at Edinburgh on Feb. 9th, 1934.

engendering the sense of fear. The ordinary mind, therefore, shrinks from surgery, and often puts off invoking its aid until circumstances have forced the issue. It is often the patient, through delay, who is responsible for the failures of surgery, and the real advance of surgery depends almost as much upon the education and collaboration of the patient as upon the technical improvements of the craft. It is evident, therefore, that to the lay mind the apotheosis of surgery will not be the performance of some difficult process requiring exquisite skill and great judgment, but the total abolition of the necessity for any surgery at all. Fortunate it is that the race of surgeons is, on the whole, a race of honest and disinterested men. Their aim is indeed the perfection of technical processes so long as the need for such processes exists; but most do not hesitate also to abandon their operation and their pleasure in its skilful performance when the necessity for it has clearly disappeared. It is only human nature asserting itself if there is a slight lag in this abandonment in the face of the large rewards that even now await the skilful, and, I fear, sometimes the dishonest, craftsman. It may be that the advance of surgery towards its annihilation would be slightly accelerated by the standardisation or abolition of fees for individual operations, but that is a larger question involving social politics. I wish rather to examine the lines upon which surgery is likely to proceed in development as a technical and highly specialised process.

SURGERY AND THE SCIENCES

The rise of surgery during the last 75 years has been so rapid that some of its votaries have become dazzled with their own brilliance. Out of this bedazzlement has repeatedly arisen the announcement that surgery has reached its zenith, and that no further developments of importance are to be expected of it. But any such pronouncement is rash and premature. Who can say what startling innovation may not suddenly arise from advances in the physical sciences, to name only one of the possible sources of benefit to surgery? For many years Harvey Cushing, practising cranial surgery at Boston, regarded a certain form of brain tumour as inoperable owing to the hæmorrhage which would follow its removal. Physical science then introduced the electrical coagulating and cutting current, finely adjustable at will. Soon afterwards Cushing was recalling those of his previously condemned patients who remained alive, in order that he might now safely remove these tumours, while controlling hæmorrhage with the coagulating current. He must have felt almost the same satisfaction as did Paré or Spencer Wells when they first procured hæmostasis by methods which were refinements compared with those of their predecessors. The cutting and coagulating currents are now rapidly coming into use and to some extent displacing "the knife." There are theoretical and practical advantages in sealing the lymphatics and small blood-vessels as the operation proceeds. Time is saved and loss of blood stopped; local dissemination of a cancer by the operation is probably prevented; and it may be safely predicted that electricity will have a considerable part in the future of surgery, for electrosurgery is only in its infancy.

The Legacies of War

This is, however, only an example of an adjunct to surgery drawn from a pure science, and its effect on surgery is indirect. The Great War, as I have already suggested, has left many legacies of surgical value, the end of which cannot be foreseen. The knowledge of fractures and their treatment that we possessed before the war seems now to have been absurdly inadequate. Our standards of results were much too low, our splints were primitive and many of them unmechanical, our methods of treatment much too static. With the innumerable gunshot fractures of the war and with minds like that of Sir Robert Jones to work upon the problems that resulted, a huge body of knowledge and experience quickly accumulated. Older methods and materials were discarded, the principle of traction began to assume its proper place, and a revolution in orthopædics was brought about. It may be said that the force of this war-time change is now spent; yet the post-war period has seen the introduction of novocain anæsthesia in the reduction of fractures, and of the various improvements in methods of fixation used by Bohler and his school. Fracture technique is, in fact, still advancing rapidly both on the continent and in this country. Also it must be remembered that it takes time for a new generation of orthopædic surgeons to arise, surgeons who are fully free to practise the newer methods and to justify them by their results. It may be that the advance in orthopædics will grow slower as the years pass, but it seems unlikely to die away for many years to come. In the meantime orthopædics might seem to be losing almost more than it gains, for few branches of surgery can have suffered more pruning as a result of the activities of the pure scientist and of the Ministry of Health. No longer are our hospitals infested with the victims of rickets and surgical tuberculosis. Heliotherapy and diet factors have dealt severe blows at the orthopædic clinic, and although unemployment has delayed this part of preventive medicine it is only a matter of time until surgery almost ceases to know these preventable diseases.

PLASTIC SURGERY

Another familiar example of the legacies of war is the advance of plastic surgery. Many of the principles had been known for centuries, but never before had there been quite the same pitiful appeal from thousands of the disfigured. It seems likely that here the limits of advance have been comparatively soon reached, and I should not anticipate that the future holds very much more in that direction. Already the sardonic observer may affect to notice a falling-off in the supply of legitimate grist for the plastic mill, and a tendency for it to emulate the mysteries of the beauty parlour. Face-lifting, and operations for the relief of abdominal obesity or for reducing the breasts to the dimensions demanded by the dictates of fashion, these all have their place. Call it æsthetic surgery if you will—it is not the highest form of our craft, but at least it is ministering to the (supposed) needs of one section of humanity. Fortunately the problem of the hare-lip has directed the attention of plastic surgeons to its frequent concomitant, the cleft palate; for there, if anywhere, was a field for gentle persuasion and refined technique, instead of the horrible crushing and mangling of infants that was formerly practised under the protection of the names of Brophie and his followers. The grafting of skin is an everyday affair, and a variety of methods are at our command, including the fascinating process of inlay graft. Even the grafting of a whole cornea has been successfully accomplished. The grafting of organs, even of the smallest, has been hitherto unsuccessful. Attempts have been made with the parathyroid gland, the

adrenal gland, and fragments of the thyroid gland, but although temporary effects have been noted while the grafted tissue was undergoing absorption, there is, as far as I know, no proved example of a grafted organ having undergone true growth in its new host. The plastic surgeon may perhaps turn his attention in the future to the extremely difficult technical problems of grafting of organs or even of limbs by means of accurate suture of blood-vessels. We may not expect to see a repetition of the miracle of St. Cosmas and St. Damian when the lower limb of a dead Moor was grafted on to the body of a Christian, but it may well be that the surgery of the future holds some technical surprises of that kind in store.

Probably the science of tissue culture will help to throw some light on the problems involved. Clearly successful grafting depends for its success on many factors controlling growth and repair of which we have but the foggiest understanding at the present time. Tissue culture is the only line of research which is likely to help in this direction, and it may indeed prove of unexpected service to surgery in general, for every surgical operation is an experiment testing the capacity of the body for carrying out repairs, and some of our failures may be due to our ignorance in this branch of biological science.

The Growing Edge of Surgery

Any mention of the legacy of war must lead us inevitably to what is at the present moment the most conspicuous "growing edge" of surgery—namely, the surgery of the thorax. With knowledge of the treatment of gunshot wounds of the thorax came a rapid advance in the general surgery of the thorax, though this is restricted for the most part to dealing with the thoracic wall and the lungs. Assaults are continually being made upon what are almost the last strongholds of the body, the mediastinum and the heart itself, but progress here is slow. Cutler's experiments in endocardiac surgery seemed ten years ago to be about to blossom and bear fruit; but the disconcerting discovery followed that the mitral stenosis which the division of the sclerosed valves was designed to relieve was responsible only in a minor degree for the patient's disabilities. Usually the heart muscle was irretrievably damaged by toxic poisoning, so that the successful performance of an ingenious and dangerous operation produced little or no improvement in the few patients that survived. Also one of these few patients, after living a few years, recently died from other causes, and it was found at the post-mortem examination that actually the valves never had been cut at all. Many attempts have been made to treat carcinoma of the œsophagus in the mediastinum; but the operative mortality remains in the neighbourhood of 100 per cent. Surgery must expect to receive an occasional set-back of this kind, and the bolder spirits will not be discouraged. For instance, Prof. Grey Turner, of Newcastle-on-Tyne, has recently recorded the successful extirpation of a carcinomatous œsophagus with subsequent provision of a new external channel, formed partly of a tube of skin and finished off with a short length of small intestine, through which the patient is now merrily swallowing beef-steaks and beer. It may be taken as a general axiom in the march of surgery, that "the nearer the heart the slower," but it is within the thorax that some of the most important hopes for the future of surgery lie. It was at one time thought that the thorax would yield its secrets as readily as the abdomen had done, but it is being realised that the physiology and mechanics of the thorax are much more obscure, and that surgery in the thorax will always have to work on a narrower margin of safety than in the abdomen. No facile analogy between the two will really represent the facts. The thoracic surgeon to attain full competence will have to add familiarity with the use of the bronchoscope and œsophagoscope to his repertory, and to be in the fullest sympathy with the problems confronting the anæsthetist. Already lobectomy for bronchiectasis is becoming an operation of repute, and further developments will surely follow.

THE SYMPATHETIC SYSTEM

Another conspicuous point in the growing edge of surgery is the surgery of the sympathetic system. It is interesting to note how from small beginnings made a few years ago, a considerable body of valuable observations has now been accumulated—although the foundations were laid largely on fallacies! It is generally realised now that Leriche's operation of periarterial sympathectomy and Royle's operation of ramisectomy for spastic limbs were based on faulty premises and observations. Yet the work of these pioneers has borne excellent fruit, and to-day, as a result of advances made with the help of the anatomist and physiologist, the various forms of ganglionectomy constitute an important branch of surgery which is certain to develop further in the future.

The foregoing are examples of something that will be added unto surgery, probably in the near future. But, taking the long view, it seems probable that in the end surgery will be gradually shorn of many of her glories, and will ultimately have to take a back seat as an unimportant branch of something else. A considerable part of my personal interests centre in the surgery of the thyroid gland, but I recognise that the thyroid harvest will not be gathered for ever. When a fuller elucidation of the pathology of simple and toxic goitre and the relationship of the thyroid to the other endocrine glands has been achieved, it is likely that surgery will be almost entirely eliminated. At the present moment the thyroid surgeon can in a short time virtually cure the majority of his patients with toxic goitre, because he is able to snap suddenly one of the most important links in the vicious circle that maintains the disease. The patient is not really cured by this rather savage form of treatment, but is enabled to live at so different a level from what she was at before that she is "cured" by comparison. It is improbable that in 50 years' time anything so crude as surgery will be used to relieve the endocrine complex known as toxic goitre. Total thyroidectomy is now being practised for the treatment of heart failure: I cannot regard it as an advance in surgery.

The Cure of Cancer

That is perhaps only a small and simple example of what is going to happen to surgery. The obvious and larger problem is what relation will the surgery of the future bear to the greatest of all human scourges, cancer. So large a proportion of surgical activity is taken up with cancer that its removal from the sphere of surgery would cause an enormous hole in the surgeon's day. Moreover, it appears to me that if this is ever to happen at all it will happen suddenly, and surgery may be caught unawares and find herself smiting at a vacuum. It seems fairly clear that the cancer problem is a biological one connected with an abnormality of growth or with a process of repair gone mad. It is a loss of control of cell division, which can be initiated by the action of specific chemical substances. So precise has knowledge on this point recently become that pure chemical

compounds have been synthetically produced, which can be made to cause a carcinoma or a sarcoma in an animal in a given time almost with complete certainty. These substances have complicated molecules, always containing the benzine ring, and have actually been made from other compounds which occur in the human body. The cancer problem is therefore partly a biochemical one, and the process of experimental cancer production is so nearly perfected that the successful reversal of the process may not be so far distant as we are often inclined to suppose. Surgery can often deal successfully with the primary cancerous growth when it is accessible. It is by the inaccessible parts of the disseminated disease that we are so constantly defeated. Cancer disseminates by the circulation, whether it be by blood-vessels or lymphatics, and perhaps it is by the same route that it will ultimately be attacked, particularly if a biochemical cause leads to the discovery of a biochemical cure. The "cancer cure," in fact, if and when it arrives, may be applied through the circulation, and since all forms of cancer appear to be closely related the same principle will apply to all of them. Once, therefore, the goal is reached a large part of surgery as we know it may be rapidly eliminated, and the surgeon be replaced as far as cancer is concerned by the vein-puncturing expert. Those surgeons who are sufficiently adaptable may be able to add the biochemical method to their repertory, for after all it will still be the surgeon who will make the diagnosis and have much of the responsibility for the treatment of the patients. Those who cannot so adapt themselves will have to rejoice with the rest of mankind as best they may, though finding a large part of their occupation suddenly removed.

It may be a long time yet before this desired consummation is achieved. But even in the meantime surgery is finding that gradual encroachments are being made on the cancer field, which was so peculiarly hers. I have borne some part myself in aiding and abetting this encroachment so that perhaps I am a biased witness; but it seems clear enough to me that radiology has virtually abolished pure surgery in cancer of the tongue, mouth, and pharynx, in cancer of the skin, anal orifice, and cervix, and in rodent ulcer. I hold unorthodox and perhaps unacceptable views on the value of radium in carcinoma of the breast, for as far as I am concerned the use of radium, or of radium combined with conservative surgery, has almost eliminated the radical operation. But this view, right or wrong, is at any rate an indication of the trend of events, that is, a gradual narrowing of the surgical circle which until recently so completely surrounded the Tree of Cancer. Radiology has at present scarcely any application in cancer of the alimentary tract, but this process of encroachment will not stop, and perhaps in the end it will be the radiologists and not the surgeons who will receive the rudest shock from the cry that "Cancer is Conquered."

There can be few departments of surgery in which technical refinement, both diagnostic and operative, has advanced more in recent times than in cranial surgery. It seems unlikely that the future will see further rapid strides, and even if it does, cranial surgery is but a relatively small department of the craft. It is highly specialised and can never be the concern of more than a few surgeons at any one time. It demands, however, the very highest type of practitioner. He must bring to his surgery a profound knowledge of physiology and neurology. He must be diagnostician as well as craftsman, and it is all these qualities which we shall demand of the few that we shall deem worthy in the future to practise surgery on our heads. This is indeed the ideal for all surgeons, to be as well versed in the science of their craft as in its technical performance, and it may be that, as surgery becomes a more restricted field, a higher and higher general standard will be expected.

Anæsthetics

The ordinary person's horror of "the knife" is equalled, and frequently exceeded, by the same person's horror of the anæsthetic. Already, if only the ordinary person could be made to realise it, most of the terrors of anæsthesia have been dispelled. The ordinary person's horror is made up of a conviction that she (though often he) will never wake up again, of a fear that the operation will be begun before she is unconscious, of memories (if there has been a previous experience) of the rubbery smell of the mask and of the feeling of suffocation and helplessness when the thing is on the face, of the smell and taste of ether, and, lastly, of the misery of vomiting and coughing with a painful abdominal wound. Modern methods of anæsthesia have already gone a long way towards eliminating these various sources of unhappiness in the patient. The use of the different narcotic drugs, such as nembutal, avertin, and sodium evipan, have made it unnecessary for any patient to know anything about the process of induction of anæsthesia. The use of local anæsthesia, spinal anæsthesia, and gas-and-oxygen have, at any rate in my own practice and doubtless in that of many others, largely eliminated ether and chloroform. It cannot be too widely known that both these drugs are to be regarded as poisons, particularly to the liver, and there can be no question to my mind that they should be encouraged gradually to drop out of use.

Often it is urged that it is wrong to use these improved methods in the teaching hospitals because when the average student gets out into the world and becomes the average practitioner he will find that circumstances force upon him the use of the older, and sometimes the simpler, methods. To some extent this is true, and it is undoubtedly the duty of the medical schools to teach *all* methods. But equally it is the duty of the medical schools to be in the van of progress, for only by the education of the young can general standards be raised in the long run. The student must always be shown the best, so that his almost inevitable fall into the rut of complacent routine may be delayed as long as possible. Education must be keyed up to the liveliest minds, not keyed down to the dullest in the matter of anæsthetics as in everything else. Thus, and thus only, will progress in the general world of surgery be accelerated. The effect of it is everywhere to be seen in the continually improving equipment of hospitals, great and small, throughout the country, and in better knowledge of how to use it for the advantage of the ordinary patient. The surgery of the future must seek to temper the wind more and more to this same ordinary patient. The surgeon will think less of his own prowess and more, ever more, of the sufferings of the patient. Even so familiar a thing as post-anæsthetic vomiting will not be taken as a matter of course, because it is nearly always avoidable. Progress in surgery implies not only increased technical proficiency on the part of the surgeon, but less pain and greater safety for the patient. It is clear that the anæsthetic question is closely bound up with this, and so good a beginning has been made with the methods I have mentioned that further improvement is bound to follow. Know-

ledge on the part of the patient that anæsthesia has no terrors makes for confidence. Confidence produces increased willingness in the patient to coöperate, and so leads directly to earlier diagnosis, earlier treatment, and better results. I therefore believe most firmly that the future of surgery lies to an important extent in the hands of the anæsthetists, and so of the chemists and pharmacologists to whose researches the whole of our recent progress in this line is primarily due.

I have indicated one or two major directions in which surgery in the future is likely to be curtailed. It is possible to enumerate many minor fields in which the same process is visible. Already the syringe has eliminated a great deal of minor surgery, such as most of the operations that used to be done for varicose veins and internal hæmorrhoids. The holocaust of tonsils still goes on, but there are signs that even here a change is beginning to appear, and it is not impossible that improved hygiene or the science of endocrinology, or both together, may eventually eliminate a large part of the lymphoid surgery that employs so many hands so profitably at the present time. The abdominal tonsil, on the other hand, shows no sign of a decline in popularity. The causes of appendicitis I believe to be many, and that anyone who thinks it will be prevented by dieting, or by regulation of the bowels, or by any one measure, is likely to be disappointed.

In many provinces of surgery there is that mysterious pendulum which swings so relentlessly to and fro. It is swinging at the present moment against the surgery of the upper abdomen in the treatment of gastric and duodenal ulcer, and no doubt it will in due course return as the tide of perforations and relapses after medical treatment begins to rise again. The time, so much desired, when the ætiology of ulcers is so well understood that they can be prevented seems still to be distant, and knowledge of how to treat them is therefore still essential. It is difficult to see how surgical ingenuity can devise many more variants of operative treatment, but the surgeon of the future may have formed a clearer idea than we have at the present moment as to exactly which is the best procedure to adopt—gastro-enterostomy, pyloroplasty, gastro-duodenostomy, partial gastrectomy, excision of the ulcer, and so forth.

The Follow-up System

Clear ideas, however, can only be attained by the acquisition of a large body of accurate statistical evidence, and this brings me to the mention of an important influence on the future trend of surgery which is certain to gain in strength as time passes—namely, the "follow-up" method of investigation. Surgery in the past has too often been content to muddle along without any clear guidance from the proved evidence of results. At the same time members of the surgical profession have often expressed discontent with the attitude shown by official scientific bodies, especially by the Royal Society, towards surgery. They have seemed to deny to surgery any scientific status, and I doubt whether even now our profession appreciates the underlying reasons for this. I am afraid the scientist has only too much grounds for regarding the surgeon as a skilled carpenter, as a man who likes carrying out experiments on the human body, but is not interested in the results. This attitude is the absolute negation of the scientific method, and is partly the cause and partly the effect of the chief weakness of many surgeons, that is, their great confidence in their own opinions. Most surgeons will deny that they are indifferent to the results, or alternatively plead that there is no time in the surgeon's day for the following-up of patients. This plea may excuse but does not justify indifference to scientific method; it merely shows the necessity for better organisation of surgical practice. The "follow-up" departments which are appearing in many centres, will, I believe, make a very big contribution to the progress of surgery, and tend to remove the aspersion on the surgeon of an unscientific approach to his problems. Erroneous "impressions" formed by individuals will be replaced by wider and more accurate information based on the histories of patients for a long period after their operations. Survival rates for a minimum of five years after treatment will be an essential basis for assessing the success or failure of any method used in the treatment of cancer. At the present time very few surgeons know even the number of recurrences that take place after their operations for hernia. Many of them believe there are no recurrences, but this is merely an agreeable ignorance of facts which can only be ascertained by a "follow-up" department. It is true that the compilation of statistics introduces a new difficulty—that of their interpretation, but I do not believe that it is beyond the wit of man to overcome this difficulty with thought and experience. Also the follow-up principle does not depend solely on statistical information for its value. If it compels the surgeon to see his patients at intervals for a long time after treatment, and to know beyond a shadow of doubt when they are dead, it will have performed a useful function. The scientific surgeon of the future will not depute his follow-up work to a junior assistant, but will see his successes and his failures with his own eyes. He may sometimes be a sadder and a wiser man, but at least he will be better able to interpret his statistics intelligently and to know when he is being misled by the pure statistician.

Standardisation and Mass Production

The general trend of human affairs at the present time is set strongly towards standardisation and mass production. Both eugenic principles and political theory favour the production of a standard man, and the time may come when all except standard men will be thrown away, a few non-standard individuals being kept, perhaps, as material for research. Surgery has hitherto kept its status as a pure handicraft—aided, it is true, by an increasing number of instruments of precision, but a handicraft it remains, aloof from politics, apart from the industrial revolution and mass production. But can we be sure that this blessed state can be indefinitely maintained? Does not a glimpse into the future induce a nightmare vision of standard operations being performed by machinery on standard men? This would tend to eliminate automatically those individuals not conforming to the standard, and so to accelerate the realisation of the eugenic ideal. Perhaps it might be permissible to offer in special circumstances and at an enhanced price an old-fashioned operation performed manually and finished with a special hand-sewn scar. Fortunately it seems to be impossible that anything so awful can ever take place, and the surgeon may look forward to a long-continued demand for the sheer skill of his naked hands (naked except for rubber gloves) in the service of suffering humanity.

I have necessarily given a very superficial survey of the future of surgery for the field is so wide and the

possibilities so great. But it is wholesome occasionally to stop and survey the situation, even superficially, and think whither it may be leading us. It may be true that consideration of the past and how we got here is more valuable than speculation on the future. It is certainly true that the past does shed much light on the conduct of the present, and it should correct all those who through ignorance of the past, through an overweening complacency in their own achievement, or through an inability to realise that methods and ideas quite unknown to them can be of value, assert that no further technical advance in surgery can take place. The statement has been made at intervals and always it has been falsified, and I have tried hard myself to avoid giving any such impression. Perhaps I have conveyed the idea that the field of surgery will always grow narrower, but that is because I lack the imagination to be able to foretell what additions to the surgeon's repertory will be made. It is undeniable that subtractions are continually occurring and yet surgical activity increases rather than diminishes. Probably this is due to increased facilities for surgery, better diagnosis, and the better education of the people in surgical matters. It is, I think, certain that contraction will eventually occur, as preventable disease is eliminated and as earlier diagnosis renders surgery less and less necessary. The enthusiastic surgeon may console himself with the thought that congenital defects (in spite of eugenics) and accidents will always remain, whatever else may be taken from him. There may, alas, even be another war to which he will look to provide fresh impetus for the development of his craft, when the force of the Great War has expended itself. But even there lurks disappointment, for the next war may not be so much a war of wounds as the last one. Death will be dealt out in more insidious ways, and surgery may not be called upon to perform so many of her wonders. Destruction will be more complete, and will be carried far beyond the front line of the combatants, so that most of the surgeons may be themselves dead or out of action. Machaon will look less god-like in a gas-mask, and he will carry in his hand a hypodermic syringe and ampoules of antibacterial serum rather than a scalpel.

Surgery as a Science

You may have perceived that I have spoken through most of this address of surgery as the term is generally understood, that is, as a handicraft; but I have protested against the attitude of surgeons who choose to stand aloof from science and so tend to tie their profession down to the status of refined carpentry. I feel sure, however, that I have given to surgery a narrower sense than it will come to hold in the future, and than it already does hold wherever surgery is most alive, for as time passes it will draw nearer to the status of an applied science. To achieve this the surgeon will coöperate more and more closely with medicine and with biological and biochemical science. Examples of this tendency can be seen to-day in many fields of surgery, such as the thyroid gland and other endocrine glands, the central nervous system, the sympathetic nervous system, the urinary system, and so on. We have heard a great deal in recent years of the value of team-work, and this has not been entirely lip-service to an ideal. The pure scientist may at any moment stumble on facts related to surgery, and if these teams exist, surgery may receive unexpected advancement. Only the other day I was shown at the Cancer Hospital a series of mice which had been the subject of experiment in connexion with the genesis of cancer. Who could have foretold that œstrin, a crystalline hormone extracted from the urine of mares, would, when painted on the skin of a male mouse, produce enlargement of the prostate and the development of large inguinal hernias? Yet such is the extraordinary fact, and, irrelevant as it may seem, it may lead in directions of importance to surgery. It is impossible to foretell exactly how this balance between surgery and the allied sciences is to be achieved, but at least it must not be said that the surgeon has remained indifferent to any discovery, of whatever nature, that might lead to the advancement of his craft. The trend of events shows that the surgical mind can possess the qualities of sympathy and collaboration, and whatever the future may hold it is safe to assert that never was surgery in general more living than it is at the present moment. We may be forgiven if we believe that this is the golden age of surgery, for, after all, it is the present, not the past or the future, in which we live.

THE HORMONES AND THEIR CHEMICAL RELATIONS*

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LECTURE III

THE application of the study of organic chemistry to the internal secretions of the thyroid itself has proved so successful that the hormone has now been synthesised. Since, however, this work is well known, it will only be necessary to give a few of the more important landmarks.

Discovery of Thyroxine

It will be remembered that the thyroid gland was the first organ to which could be attributed an internal secretion. The classical writings of Sir William Gull in 1874 described the condition of myxœdema in great detail and laid great emphasis on the thyroid atrophy. Three years later Ord (1878) confirmed these observations and suggested the name—myxœdema. In 1895 Kocher demonstrated the relationship between natural myxœdema and that following thyroidectomy. It was also shown that post-operative myxœdema responded to treatment by the administration of thyroid gland.

The next important stage was the discovery of iodine as a constituent of the thyroid gland. It was put forward as a suggestion by Kocher in 1895 that normal thyroid gland might possibly contain iodine, since he had shown that iodine had a profound influence upon the morphology and activity of the organ. Tschirch (Kocher, 1895) attempted the search for this element, but entirely failed. The proof that the thyroid contained iodine was given by Baumann (1895), who continued his work until he isolated a protein which he termed iodothyrine. This substance contained iodine and possessed distinct physiological activity as studied upon thyroidectomised animals and myxœdematous human beings. Quantitative studies showed that the compound was more active weight for weight than thyroid gland, and that the iodine content was considerably increased.

From this time onwards a series of very elaborate

* The Goulstonian lectures for 1934, delivered before the Royal College of Physicians of London on March 6th, 8th, and 13th. Lectures I. and II. appeared in our last two issues.

chemical experiments were performed and various protein-like concentrates were obtained which were claimed to represent the actual internal secretion of the thyroid in a pure state. It will not be profitable to review all this work, but to jump to the year 1915 when the publication of Kendall's well-known experiments resulting in the discovery of the true internal secretion of the thyroid appeared (Kendall, 1915). The process resulting in the separation of this compound was extremely complicated and the yields very poor. The essential part of the manufacture consisted in a hydrolysis of the gland with barium hydroxide solution. So poor was the yield, that starting with over a ton of thyroid he obtained relatively few milligrammes of the active body. The formula $C_{11}H_{10}O_3NI_3$ was allotted to the compound in view of its percentage composition. Kendall maintained that the compound was an iodine derivative of an indol compound, but that has since been disproved and it will be unnecessary to consider it.

The crystalline compound isolated by Kendall was very soon found to be the most potent substance for raising the basal metabolic rate of any hitherto described, and it was only natural that severe competition ensued between clinicians and organic chemists for the few milligrammes of this body that were available. Until an adequate method for the preparation of thyroxine in large quantities could be obtained, no progress of any sort could be expected.

The next advance was made by Harington (1926) who, in 1926, described a new method for the isolation of thyroxine from the thyroid gland and one which gave a very much better yield, thus enabling a detailed study of the constitution of this interesting substance to be made. A long series of experiments proved that Kendall's ideas as to the constitution were incorrect, and that thyroxine was a derivative, not of tryptophane, but of tyrosine. Harington was able definitely to establish the constitution and to prove that thyroxine has the formula seen in Fig. 16. Still later, with Barger, he was able to synthesise the substance (Harington and Barger, 1927).

When injected subcutaneously or intravenously in minute doses, thyroxine is capable of raising the basal metabolic rate of experimental animals and of human beings. It will also completely relieve the symptoms of myxœdema. Its activity, however, when given by mouth is very slight owing to its great insolubility, and one must conclude that very little is absorbed.

Substitutes for Thyroxine

In view of our interest in synthetic substances it is necessary to consider certain other iodine-containing compounds present in the thyroid gland. One of these is di-iodo-tyrosine (Fig. 17). This compound appears to be completely inactive when administered in a similar manner to thyroxine. In so far as is known this substance is not a normal constituent of food, and therefore must be synthesised in the body—possibly in the thyroid. Harington suggests that it may represent a stage in the synthesis of thyroxine.

Another interesting compound is a derivative of thyroxine—namely, 3 : 5-di-iodo-thyronine (Fig. 18). This compound does not appear naturally in the thyroid in so far as is known, but can be made relatively easily in the laboratory. Gaddum (1927–28 and 1929–30) has observed that this compound possesses definite activity of the same type as is displayed by thyroxine. He found that the activity, as measured by acceleration of metamorphosis of tadpoles, was about one-fifteenth the activity of thyroxine; whilst the effect of oxygen consumption of rats was about one-fortieth of that of thyroxine. In a recent paper by Anderson, Harington, and Murray Lyon (1933) clinical experiments with this compound were described. The desirability of using it is indicated by its relatively much greater solubility in water than thyroxine, and hence the possibility of its activity when given by the oral route. They were able to show that this compound when administered in doses of 50 to 75 mg. daily was capable of relieving all the symptoms of severe and well-established myxœdema. In all cases the basal metabolic rate was restored to normal and the characteristic myxœdematous appearance vanished. They justly concluded that this compound could replace thyroxine in every way, and that since it is readily obtainable by synthesis in a pure state, there is every reason to hope that eventually its use will entirely replace that of thyroid extract which, even at the best of times, is only capable of

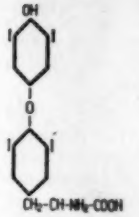

FIG. 16
Thyroxine.

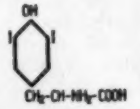

FIG. 17
Di-iodo-tyrosine.

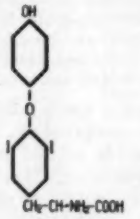

FIG. 18
3 : 5-di-iodo-thyronine.

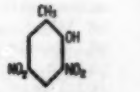

FIG. 19
4 : 6-dinitro-o-cresol.

extremely rough standardisation. These workers do not discuss in any detail the reason for the similarity of activity between thyroxine and 3 : 5-di-iodo-thyronine. They suggest that perhaps this compound is transformed in the body into thyroxine itself. The interest from our point of view however lies in the fact that they have shown that the thyroid lock may be picked by a skeleton key. If we contrast the two formulæ it can be seen that they are relatively near to each other in structure, and all that is required is the introduction of two iodine atoms into the 3′ : 5′ position. However, the phenomenon is precisely the same as in the œstrin substitutes, but in the latter case the similarity between the natural substance and the skeleton key is by no means so close.

It will be remembered that in discussing the significance of the activity of the œstrin substitutes the idea that they were converted in the body into œstrin did not appear to be justifiable, particularly when one bears in mind that this conversion, if it occurs at all, would occur in the body of the ovariectomised animal. If any organ were to be responsible for this conversion, one would have thought that the ovary was the most likely. In the same way one would also have thought that the thyroid gland would have been the seat of the conversion of 3 : 5-di-iodo-thyronine into thyroxine. Since, however, this compound is active in cases of myxœdema with presumably little or no functioning thyroid, it would appear that the same arguments apply in this problem as in the substitutes for œstrin.

Where do Hormones Act?

Hitherto we have considered only the actions of these hormones and their substitutes upon surviving animals, and in order to introduce the next type of synthetic substance it will be necessary for a brief

period to consider the actual site of action of these hormones. If we take one of the apparently simpler examples—namely, the action of insulin—it appears at first sight that insulin reduces the blood-sugar by increasing the oxidation of this substance in the body. This theory was held as a theoretical conception before insulin was isolated, and it was therefore with great surprise that no action of the then new hormone insulin could be demonstrated on either glucose solutions or on isolated tissues.

It is well known that thanks to the methods of Warburg (1926 and 1928) it is possible to work out the metabolism of slices of surviving tissue using some 10 mg. or so, and by the adoption of manometric methods the oxidative process of the tissue may be investigated. Very roughly it may be stated that this includes the breakdown of carbohydrate by two entirely distinct methods. The first is by a process known as respiration in which the glucose is burned to carbon dioxide and water; this we know to be controlled by an organo-metallic catalysis process of which the metal is iron and the catalyst most probably a hæmatin derivative. The second process is one known as glycolysis in which the carbohydrate is converted to lactic acid; this may occur both aerobically and anaerobically. These two systems are quite separate but bear a certain quantitative relationship to one another.

If we take a tissue slice and add insulin to it, and measure the metabolism continuously by the methods of Warburg, it is not possible to demonstrate any change whatsoever. It is also very strange to recount experiments with thyroxine. The addition of thyroxine to such a tissue slice will not produce any increase in either respiration or glycolysis, no matter how much thyroxine be added. We are here faced with a very complex problem in that insulin and thyroxine when injected into intact animals will produce profound modification of the carbohydrate metabolism and total metabolism respectively, and yet are completely without activity on the isolated tissue slice. It is indeed unfortunate that no explanation can as yet be advanced to explain this difficulty. There are of course a few examples of hormones that will act upon the isolated organs, for example oxytocin and adrenaline, yet it must be remembered that a surviving uterus possesses an elaborate arrangement of sympathetic nerves, whilst a spiral cut from an artery which can be made to contract by adrenaline also possesses a highly organised structure. Yet it can readily be proved that the respiration and metabolism of these tissue slices in the Warburg manometric apparatus are capable of responding to various chemical agents. For example, the addition of methylene-blue will cause a marked increase in respiration, and the same may be said of other compounds such as the naturally occurring pyocyanine and also the synthetic pyocyanine.

Action of the Nitrophenols

I propose to discuss a compound which possesses the unique quality of acting, not only on the body as a whole, but also on the tissue slice. This compound, 4 : 6-dinitro-o-cresol, possesses the formula shown in Fig. 19 and belongs to the group of polynitrophenols.

It has been known since the year 1885 that certain nitrophenols possessed a marked influence on metabolism; this was shown first by Cazeneuve and Lépine (1885). They were able to show that certain nitrophenols were toxic, and when injected in small and repeated doses death occurred with hyperpyrexia.

Little attention appears to have been paid to this important problem until the year 1928, when a series of experiments were commenced in Heymans's laboratory in Ghent (Heymans and Bouckaert, 1929; van Uytvanck, 1931; Moraes and Casier, 1933). Heymans and his collaborators were able to show that 2 : 4-dinitro-phenol was capable of causing death from hyperpyrexia in pigeons and dogs when administered in small doses at daily intervals, and that before the rise in temperature there was a very marked rise in the oxygen consumption.

In 1932 Plantefol and his collaborators published an extensive work on the pharmacological activity of 2 : 4-dinitro-phenol (Plantefol et al, 1932). In this important publication will be found the full pharmacological details of the action of 2 : 4-dinitro-phenol. They were able to show that the compound raises the basal metabolic rate in all animals whether injected subcutaneously or given by mouth. They also proved that the compound increased the respiration of yeast cells. In the final paper in this monograph they demonstrated the fact that only those nitrophenols which possessed two nitro groups in a position corresponding to the 2′ : 4′ were active. Other dinitro- or polynitro-phenols appeared to have the reverse effect.

Last year Cutting, Mehrtens, and Tainter (1933) published an account of the uses of dinitrophenol for the purpose of stimulating human metabolism, particularly with a view to producing a reduction in weight. They repeated the earlier experiments of Heymans, Plantefol, and others, and they were able to confirm that the administration of the compound to animals resulted in an immediate rise in basal metabolic rate. When daily doses of 3 to 5 mg. per kg. of body-weight were given to patients the basal metabolic rate rose rapidly to about +40 per cent. and remained at this level for as long as it was administered. As soon as the drug was withheld the basal metabolic rate fell to normal. They were interested solely in the treatment of obesity and their conclusions are that the compound is quite safe to use for a reduction in weight.

Work has been in progress in my laboratory for a considerable time on this problem and many polynitrophenols have been tested. Together with Sir William Pope (Dodds and Pope, 1933) I was able to demonstrate that 4 : 6-dinitro-o-cresol was many times more potent than 2 : 4-dinitro-phenol, and that its immediate toxicity to animals was of about the same order as the dinitrophenol. The various nitrophenols were investigated by administering them either by subcutaneous injection dissolved in sesame oil or by oral administration to guinea-pigs whose basal metabolic rate was followed by means of the technique described in the study of the thyrotropic hormone.

A typical example of the increase in oxygen consumption is shown in the following experiment. The basal oxygen consumption of the guinea-pig in question was found by the method already referred to, to equal 0·0135 c.cm. oxygen per gramme of guinea-pig per minute; the temperature of the animal at this stage was 97° F. Eight milligrammes of dinitro-o-cresol were dissolved in sesame oil and this was administered by subcutaneous injection. One hour afterwards the oxygen consumption had risen to 0·0376 c.cm. per minute and the temperature had increased to 100·9° F. Four hours later the temperature had reached 102·8° F., whilst the oxygen consumption had increased to 0·0460 c.cm. per gramme of guinea-pig per minute. The exactly similar experiment with 2 : 4-dinitro-phenol produced a rise of about one-fourth of the magnitude.

CLINICAL EXPERIMENTS

We concluded that dinitro-o-cresol was a much more suitable substance than dinitrophenol for clinical experimentation, since weight for weight it is many times more potent, and appeared to be of about the same order of toxicity. Together with Robertson (Dodds and Robertson, 1933 [1]) I therefore proceeded to investigate the effects of this compound upon normal human beings.

The first series of experiments here outlined were those in which 3 mg. per kg. of body-weight were given. This caused alarming increases in the basal metabolic rate, from a normal of −5 to +70 in five days in one case, and from −10 to +100 in another. On withdrawing the drug the metabolic rate fell rapidly and within four days after the administration was discontinued the basal metabolic rate was down to normal.

A series of very interesting toxic phenomena were found when the basal metabolic rate rose above +50. The patients were uniformly restless and uncomfortable and suffered from severe attacks of sweating. Strange to say they were drowsy during the day and restless at night, the disturbed nights being mainly due to the great increase of sweat. Some patients suffered from severe headache, and all showed a slight lemon yellow pigmentation of the sclerotics and the skin. A very careful investigation of the blood and urine was performed when this pigmentation was at its height, but no evidence of excess of bile-pigments or their derivatives could be discovered in either blood or urine. The temperature was only slightly increased even when the basal metabolic rate was increased to +100. The patients also suffered from loss of appetite and felt very depressed and miserable.

FIG. 20.—B.M.R. raised to + 20 by dinitro-o-cresol. Myxœdema unrelieved.

FIG. 21.—B.M.R. raised to +10 by thyroid. Myxœdema completely relieved.

One of the most striking points about this elevation of the basal metabolic rate was that it was unaccompanied by a corresponding increase of pulse-rate or those changes which have been described by Read (1922) occurring in hyperthyroidism. This was the first indication to us that the action differed very considerably from that of thyroxine. We were able to obtain another striking demonstration of the difference between the action of thyroxine and dinitro-o-cresol, since we were able to observe its effect on a case of myxœdema (Dodds and Robertson, 1933 [3]).

The subject was a man, aged 42, who had had well-marked myxœdema and had been attending hospital for some three years. It had been found necessary to administer 2 grains of thyroid (B.P., 1932) daily in order to maintain the basal metabolic rate within normal limits and to keep him free from symptoms and signs of myxœdema. The administration of thyroid extract was stopped and the symptoms of myxœdema were allowed to develop. At this stage the basal metabolic rate as determined by the Benedict-Roth apparatus was −18. In the first place he was given daily doses of dinitro-o-cresol at the rate of 3 mg. per kg. of body-weight—that is to say the same amount that produced a rise of roughly +100 per cent. in three or four days in normal persons. The basal metabolic rate rose sharply from −18 to +73 per cent. and again the same toxic symptoms were observed—namely, lethargy during the day and intense perspiration during the night, loss of appetite, and general discomfort. The drug was discontinued and the basal metabolic rate fell rapidly to −18.

This observation proves conclusively that the myxœdematous person, with presumably no functioning thyroid tissue, responds as well to the action of this drug as does the normal person. In the second series of observations, sufficient quantity of the drug was administered daily to keep the basal metabolic rate well above normal, and it was found that in this case 100 to 150 mg. per day administered by mouth enabled him to maintain the basal metabolic rate at +20. Although his basal metabolic rate varied between +20 and +30 per cent., his myxœdema was unaffected as can be seen by the picture (Fig. 20), which shows the stigmata of the disease very clearly.

We have here, therefore, a very interesting spectacle of a myxœdematous patient with a basal metabolic rate of between +20 and +30, thus indicating that thyroxine does not relieve the symptoms and signs of myxœdema by merely raising the basal metabolic rate. The drug was then withdrawn and the basal metabolic rate fell to −18; thyroid was then administered until the basal metabolic rate was maintained at between 0 and +10 per cent. The symptoms of myxœdema disappeared in a very short time, and the next picture (Fig. 21) shows the patient again with a basal metabolic rate of +10 with all his symptoms of myxœdema cleared up. It is important to bear in mind that the first photograph, showing the symptoms and signs of myxœdema obviously present, was taken when his basal metabolic rate was +20 to +30 per cent.

These experiments prove conclusively that we are here dealing with an entirely different mechanism and that a depression in basal metabolic rate bears no relation to myxœdema, nor, alternatively, will an artificially raised basal metabolic rate clear up the symptoms, and that therefore thyroxine must act in a manner quite apart from its mere stimulation of metabolism.

RESPIRATION OF ISOLATED TISSUES

There is one final difference between the action of dinitro-o-cresol and thyroxine that I have to bring to your notice. It will be remembered that I have already called attention to the fact that naturally occurring hormones will not act upon isolated tissues, and that however much thyroxine be added to a surviving slice of tissue, it is impossible to demonstrate any increase in the oxidation by the method of Warburg. In my laboratory Greville and I (Dodds and Greville, 1933) have been able to show that the reverse obtains with dinitro-o-cresol. The measurements were made in the Haldane-Barcroft-Warburg

apparatus, and the respiratory quotients in carbonate-containing salt solutions were found by the method of Dickens and Simer (1930 [1]). It was found that dinitro-o-cresol greatly increases the respiration of surviving kidney tissue.

Barron (1930) has shown that only those tissues having aerobic glycolysis show an increased respiration in the presence of reversible dyestuffs such as methylene-blue.

The action of dinitro-o-cresol on the tissue slice is found to be equally remarkable when dealing with malignant tissue. It has been shown by Dickens and Simer in my laboratory (1930 [2]) that the respiration of tumour slices is definitely defective, and that the respiratory quotient is below that of the normal. Since dinitro-o-cresol appears to increase respiration it was felt that the effect of this compound on the metabolism of malignant tissues would prove interesting. In conjunction with Greville (Dodds and Greville, 1934) I was able to show that dinitro-o-cresol appears to increase the respiration of tumour slices, but at the same time it also increases the glycolysis. These results are very remarkable in that they appear to differ from the action of all known stimulants of metabolism.

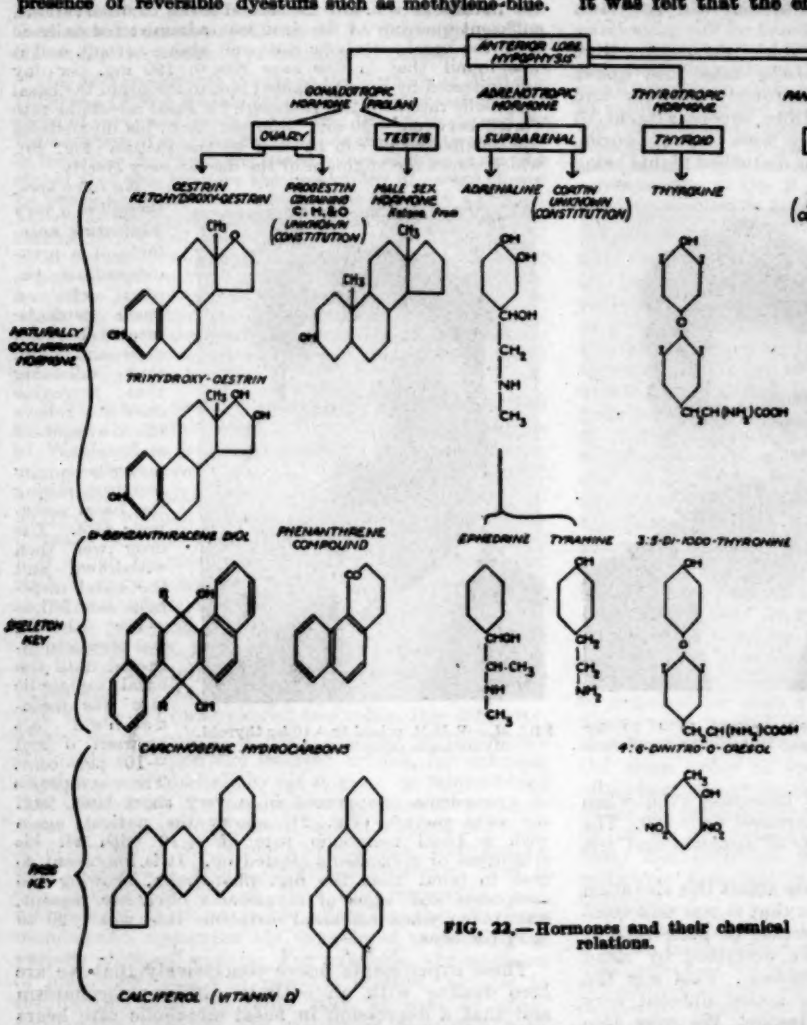

FIG. 22.—Hormones and their chemical relations.

The moment to give a detailed account of the mechanism of the action of this remarkably potent substance. It would appear, however, that one is justified in assuming that normal tissues even when saturated with oxygen have their respiration limited by the oxygen transfer catalysts and not by the substrate activating enzymes. We are pursuing this problem not only in connexion with normal tissue but also in connexion with malignant tissue.

Now kidney tissue has a very low aerobic glycolysis and its respiration in glucose is slightly decreased by methylene-blue. We found that dinitro-o-cresol in concentrations of 10^{-5} molar will increase the respiration up to 80 per cent. with kidney in lactic acid-containing phosphate media. This increase is maintained for at least an hour. The Q_{O_2} may rise to a height of 60 which is double the normal value for rat retina in glucose. The respiratory quotient determinations made by the method referred to above indicate that this increased oxygen consumption represents complete oxidation of the foodstuffs. Respiration is also greatly increased in pyruvate-containing media, and is maintained in the theoretical respiratory quotient for pyruvate oxidation—namely, 1·2. Another remarkable observation made was that the respiration of kidney in the presence of glucose is increased in bicarbonate but not in phosphate-containing media. At present we are at a loss to explain this interesting phenomenon, which is all the more remarkable when it is remembered that Friedheim (1932) found that pyocyanine gave the reverse effect.

CONTRAST BETWEEN THYROXINE AND DINITRO-O-CRESOL

Here then we have an entirely different type of synthetic substance which appears on the surface to resemble very strongly the action of thyroxine, yet when a careful and detailed study is made is found to be entirely different. Thyroxine, it must be again pointed out, has no action whatsoever on the tissue slice, and requires the whole of the functioning organism for it to exert its effect. On the other hand, dinitro-o-cresol will act on the body as a whole and equally well on the tissue slice. The therapeutic applications of this latest substance may be very great, since it may be used with relative safety, provided adequate control be undertaken, for the reduction of weight, and in addition provide a very valuable substance for the experimental stimulation of metabolism. Unlike the other synthetic substitutes such

as 3 : 5-di-iodo-thyronine and the various phenanthrene and di-benzanthracene derivatives, it is incapable of replacing the activity of the natural substance. These latter require either the intact animal, or at least part of the intact animal, and therefore must act in an entirely different manner. It is hoped that these observations will concentrate the attention of workers on the fundamental problem of the action of hormones.

To many it would appear that the isolation of the hormone represents the be-all and end-all of the experimentalist's aim and object. Yet we know that unless the actual mechanism of action is understood, we only understand one fraction of the problem. Until we can find out where the hormones act and explain why dinitro-o-cresol will act upon an isolated tissue slice whilst thyroxine is without action, we cannot claim to have progressed very far in the study of these phenomena.

The Mechanism of Simmonds's Disease

Let us now return to our starting-point—namely, Simmonds's disease. Here we see that a destruction of the anterior lobe of the pituitary causes degeneration of the thyroid, the ovaries and testes, the pancreas, the suprarenal, and possibly the parathyroids. We have only studied in any detail the gonadotropic hormone (prolan) and the thyrotropic hormone, and we have seen that these hormones of unknown constitution and protein character cause the organs mentioned above to produce substances that are capable of being attacked by the organic chemist.

I cannot here consider in any detail the adrenotropic hormone which has been described by Collip, Anderson, and Thomson (1933). They showed that in hypophysectomised animals definite changes in the suprarenal gland could be seen and these could be prevented by the administration of extract of anterior lobe.

Anselmino, Hoffmann, and Herold (1934) have confirmed this work, and they have also been able to demonstrate similar alterations in the pancreas and in the parathyroid glands of hypophysectomised animals, and that these changes could be prevented by the administration of a suitable extract (Anselmino, Herold, and Hoffmann, 1933,[1] [2]; Anselmino and Hoffmann, 1933).

We are now in a position to understand the mechanism of Simmonds's disease. Perhaps the accompanying diagram will go some way towards clearing up and sorting out this elaborate tangle of hormones (Fig. 22). We can see in it hormones acting upon the thyroid, gonads, suprarenal, pancreas, and parathyroid. Remember that these hormones are of the protein character and at present of unknown constitution, and it must be admitted that even the great advances in the study of organic chemistry are not yet adequate to deal, either from the analytical or the synthetic point of view, with these compounds. The respective organs mentioned above, when activated by the anterior lobe, produce their respective hormones which, with the exception of the pancreas, are clear-cut chemical entities which have yielded their secrets of constitution to the art of the organic chemist; their structure is also shown on this diagram.

Together with these formulæ appear the graphic formulæ of a series of skeleton keys which are capable of opening the lock equally well, and at one side of thyroxine and 3 : 5-di-iodo-thyronine, under adrenaline, will be found two skeleton keys—namely, ephedrine and tyramine, both of which appear to act in the same way as adrenaline.

The final column running transversely across the diagram has been labelled Pass Keys. In this group of compounds are found substances which will open more than one biological lock. Under the sex hormones we find the two carcinogenic hydrocarbons, 1 : 2-benspyrene and 5 : 6-cyclopenteno-1 : 2-benzanthracene which, in addition to causing malignant disease when applied to the skin, are also capable of producing œstrus; here we also find calciferol or vitamin D which can protect against rickets and at the same time will produce œstrus if given in sufficient quantities. Included in this category is 4 : 6-dinitro-o-cresol under the heading of the thyroid secretion. This will perform part of the functions of the thyroid hormone, yet will not protect against myxœdema; on the other hand it will stimulate the metabolism of the tissue slice.

In general it would appear that the anterior lobe of the pituitary produces hormones of extreme complexity belonging to the protein class which act upon organs such as the thyroid, suprarenal, testes, and ovaries, which in turn produce hormones which have yielded their secrets to the organic chemists. These in turn may be imitated by similar compounds manufactured entirely in the laboratory without any connexion with any biological material. There still remains a very large section of the chart to fill in.

Conclusion

The first Goulstonian lecture was delivered in the year 1639, but to a biochemist the lectures for the year 1831 are amongst the most interesting. Exactly 103 years ago, at about this time of the year and in the same theatre, Dr. William Prout delivered three Goulstonian lectures before Sir Henry Halford, the then president, and the censors. It is safe to say that Dr. Prout was one of the first physicians to realise the importance of chemical knowledge in relation to medicine. In the first place he possessed an excellent knowledge of the advanced organic chemistry of the day, and was the first to apply this knowledge in detail to problems of animal and human metabolism. There can be little doubt that Dr. Prout's writings formed one of the major stimuli to Liebig.

It would take too long even to summarise the important researches of this distinguished Fellow of the College. Intimately concerned as he was in the controversy concerning Dalton's theory, he found time to establish beyond all doubt and in the face of the bitter opposition of Claude Bernard, the identity of hydrochloric acid as a normal constituent of the gastric juice. It is interesting to note the tone of his lectures. To the present-day reader, accustomed to the highly technical scientific papers, the writings of the period we are discussing are very involved, and the meanings are frequently wrapped up in elaborate phraseology. This philosophical method of approach to medical and scientific problems was, however, the order of the day. It must be remembered also that the great science of organic chemistry had only just been founded, and it was all but impossible to believe that the organic chemist would solve the composition of the most complex compounds in nature. Bearing this in mind, we can well understand the warning that Prout gives to his audience in the first Goulstonian lecture. He warns them against expecting too much from the chemist, and he remarks that "he (the chemist) will soon discover, for example, that nature will not permit him to officiate as her journeyman, even in the most trifling degree" (Prout, 1831). I trust that the evidence I have brought forward will convince you that even

so discerning a prophet as Dr. William Prout took too gloomy a view of the future of chemistry as applied to medicine.

I record with pleasure my indebtedness to those who have kindly read through the manuscript of these lectures and have suggested improvements and corrections: Mr. J. W. Cook, D.Sc., Prof. E. L. Kennaway, F.R.S., Mr. W. Lawson, and Dr. J. D. Robertson. To Miss M. I. Powell I owe a very great debt for her care and trouble in the preparation of these lectures.

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LEICESTER ROYAL INFIRMARY.—The annual report of this hospital fills an octavo volume of 360 pages. In 1933 admissions numbered 7069; the children's hospital received 1319 patients. There were 13,250 new out-patients and 20,592 casualties. Traffic accident cases numbered 1313, all but 40 of which were motor casualties. Of this total 296 cases were admitted; they spent 6557 days in hospital and cost £2850. For the third time in the last 16 years income met expenditure; the total income of £86,452 provided a credit balance of £30. The infirmary now possesses nearly half a gramme of radium element, which cost £6922. The Leicester and County Saturday Hospital Society is equipping Overstrand Hall, Cromer, as a home for female patients, and it will be opened at Whitsuntide. The erection of a home for men in the grounds will then be begun. Consequential changes will eventually liberate 50 beds for women and 60 for men.

THE CLINICAL INVESTIGATION OF STAPHYLOCOCCAL TOXIN, TOXOID, AND ANTITOXIN

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THERE is a wide difference of opinion concerning the use of such measures as vaccine therapy, chemotherapy, and the administration of yeasts in the prophylaxis and treatment of boils and other staphylococcal diseases (vide Hallam, 1932); in general the results have been disappointing, and some other adjunct to surgery is clearly called for. Recently investigations have been made of the rôle of circulating antitoxin in affording protection against natural and experimentally induced infection, and concentrated antitoxic sera have become available for therapeutic purposes. Staphylococcal toxoid has also come into clinical use experimentally. The purpose of this paper is to describe a few experiments we have carried out with staphylococcal toxin, toxoid, and antitoxin, and, by correlating this work with observations which have been made in Australia, Canada, and Germany, to draw attention to some of the immunological problems which still await elucidation, more especially on the clinical side. Hitherto comparatively little has been done by pathologists in this country.

STAPHYLOCOCCAL TOXINS: PREPARATION AND POTENCY

Toxins have been prepared from a number of strains on Burnet's 0·8 per cent. agar medium to which Parker's 2 per cent. buffered broth (modified) has been added after 48 hours' growth (Parish and Clark, 1932). For assessing the value of our experimental toxins we have used skin neutralisation tests in the guinea-pig, and hæmolytic titrations using rabbit corpuscles, the potency in each case being expressed in terms of the amount of a laboratory standard serum "K," which has completely neutralised 1·0 c.cm. of toxin. Technical details of the hæmolytic test are discussed later in this paper.

Lightly coloured variants of *Staphylococcus aureus*, Wood 46, which was isolated in Australia from a case of extensive infected burns, have consistently produced good toxin in our hands; 1·0 c.cm. of each of eight successive batches of toxin has required for its neutralisation between 0·04 and 0·13 c.cm. of standard serum K, both in vivo and in vitro. These strains have been largely used for the preparation of toxin and toxoid for immunisation. Lightly coloured variants of other *aureus* strains have also produced better toxins than the parent cultures. For example, 1·0 c.cm. of toxin, prepared from a culture isolated in Sweden from an infected arm associated with vaccination, was equivalent to 0·003 c.cm. of serum K by guinea-pig intracutaneous test and 0·0025 c.cm. by hæmolytic test, whereas 1·0 c.cm. of toxin from a lightly coloured variant of this culture neutralised 0·01 c.cm. of serum K by both tests. In our series there has been no relationship between the potency

of the toxin prepared by our method and the clinical severity of the condition from which the strain has been isolated; we have failed completely to prepare good toxin even from the Bundaberg strain which was responsible for the deaths of 12 children from staphylococcal septicæmia in 1928. A similar observation has of course been made in diphtheria, for it is well known by immunologists that strains of *Corynebacterium diphtheriæ* isolated from clinically severe and fatal cases are often of low toxigenicity under the conditions in which potent toxins are usually prepared in the laboratory.

The guinea-pigs "intradermic value," and the hæmolytic value using rabbit corpuscles as determined by combining power, have always approximated to one another, irrespective of the potency of the toxins. Titrations with sheep corpuscles have, however, sometimes given entirely different readings. Neisser and Wechsberg (1901), Bigger, Boland, and O'Meara (1927), and Gross (1932), amongst others, have commented on the differences in hæmolytic titre obtained with the blood of different animals, and Glenny (unpublished) is at present engaged in a special study of the different toxic constituents concerned and their corresponding antibodies. At this stage of the investigation the worker in the clinical laboratory, who is limited in the scope of his inquiry and in the numbers of toxins and sera at his disposal, should confine himself solely to titrations with rabbit cells. He will then have much less difficulty in deciding upon the end-point, and will not be handicapped, as in titration with sheep cells, by having to pay attention to the phenomenon of "hot-cold" lysis (Bigger, Boland, and O'Meara, 1927; Bigger, 1933).

PREPARATION OF STAPHYLOCOCCAL TOXOID

The toxoid has been prepared by adding 0·5 per cent. of formalin to the culture filtrates and incubating for 3 to 14 days at 37° C. to detoxicate. As a preliminary to investigating the antigenicity of the toxoid in laboratory animals or man, tests have always been carried out to ensure absence of toxicity and retention of combining power.

TITRATION OF STAPHYLOCOCCAL ANTITOXIN (ANTIHÆMOLYSIN)

We have already indicated that the antihæmolytic titre, when rabbit corpuscles are used, is a useful measure of antitoxic content. Since the titration of the antihæmolysin present in a patient's serum may furnish valuable information of his response to active immunisation with toxoid or passive with antitoxin, we give our technique in some detail.*

The reagents required include (*a*) our "standard" staphylococcal toxin, B.8750, (*b*) our "standard" staphylococcal antitoxin K, (*c*) rabbit red blood corpuscles (R.B.C.), thrice washed in normal saline, and re-suspended in saline—2 per cent. of "packed" R.B.C.—made up fresh each day, (*d*) the patients' sera, and (*e*) normal saline. It is sufficiently accurate to use dilutions of toxin and serum, prepared on a 50 per cent. difference scale. Two pipettes should be specially marked and set aside for use only with (*a*) undiluted standard toxin, and (*b*) undiluted standard serum respectively. They should on no account be used for any purpose other than measuring undiluted standard toxin and serum. It is advisable to use a separate pipette for each patient's serum, and all pipettes should be thoroughly washed out after use.

The minimum hæmolytic dose (M.H.D.) of standard toxin B.8750 has been determined by mixing in a series of tubes (*a*) a series of toxin dilutions showing 50 per cent. differences, 0·5 c.cm. to each tube, (*b*) 0·5 c.cm. saline, and (*c*) 1·0 c.cm. of 2 per cent. washed rabbit R.B.C. Readings have been made after 1 hour at 37° C., the end-point being the last tube to show complete hæmolysis; from this, the M.H.D. of the toxin can readily be calculated. Since the R.B.C. of different rabbits show individual variation in their resistance to hæmolysis, it has been customary to take the average end-point of a number of titrations as the true M.H.D. of standard toxin B.8750. On this basis, 2 M.H.D. of this toxin are contained in 0·5 c.cm. of a dilution of 1 in 20. When this dilution is used, the end-points of the antihæmolytic titres of sera undergoing test remain constant from day to day. The explanation is that, in titrations involving the neutralisation of toxin by antitoxin, R.B.C. added to the mixtures act solely as an indicator to detect the presence of uncombined toxin.

The method of setting up the titrations of the antihæmolytic power of sera is as follows: In each row of tubes are mixed together (*a*) a series of serum dilutions showing 50 per cent. differences, 0·5 c.cm. to each tube, and (*b*) 0·5 c.cm. of toxin B.8750, diluted 1 in 20. Five minutes later 1·0 c.cm. of 2 per cent. washed rabbit R.B.C. is added, and the contents of the tubes are again thoroughly mixed. After 1 hour at 37° C. the tubes are once more inverted to mix the contents, and then removed from the water-bath. The unhæmolysed R.B.C. are given an opportunity to settle, and the results are then read—usually after one to two hours. If desired, readings may be made after standing overnight, when the end-point will be the same as when readings are taken after a shorter interval (this is only of general application when rabbit R.B.C. are used in the titration). The end-point we have taken is the last tube to show complete absence of hæmolysis—i.e., complete neutralisation of the toxin.

In every series of tests of this type it is important to include a "standard" antitoxin as control. Our "standard" serum is conveniently represented by the symbol K, indicating that it is a constant. Since it is considerably more potent than samples of human serum, it is diluted 1 in 100 as a preliminary to titration on a 50 per cent. difference scale. The results of titrations of patients' sera are expressed as decimal fractions of serum K, never in terms of a variable such as M.H.D. of toxin. The outstanding advantage of this method of expressing the results is that, as soon as an official standard serum is adopted, the potency of sera titrated by this technique will be capable of being expressed in terms of the official standard.

CIRCULATING ANTITOXIN IN "NORMAL" ANIMALS AND MAN

Since Neisser and Wechsberg (1901) first demonstrated the presence of natural antibody in the sera of "normal" laboratory animals and human subjects, a number of workers have made confirmatory observations. The results of our titrations, using as the test toxin our standard toxin B.8750, are given in Table I.

TABLE I

Circulating antitoxin (antihæmolysin)—"normal" sera

—	Sera examined.	Antitoxin as decimal fractions of "standard" serum K.						
		0–0·003	0·007	0·01	0·02	0·03	0·05	0·07
Rabbit ..	100	88	2	7	1	2	0	0
Guinea-pig .	50	41	0	2	2	5	0	0
Horse ..	50	1	7	11	5	18	6	2
Human ..	100	31	34	30	4	1	0	0

This shows a wide variation in the antihæmolytic titre of different animals and men. A similar observation has been made by Bryce and Burnet (1932), who have also shown that about 50 per cent. of 61 normal rat sera which they examined contained demonstrable antitoxin. That so many animals of different species have appreciable amounts is not surprising in

* A memorandum giving full details of the technique of titrating the antihæmolysin in human serum was prepared in these laboratories and distributed at the January meeting of the Association of Clinical Pathologists.

view of the widespread distribution of the staphylococcus.

CIRCULATING ANTITOXIN IN HUMAN DISEASE BEFORE TREATMENT WITH TOXOID OR ANTITOXIN

A number of papers, giving the results of titrations, have recently appeared in Australia, Germany, and Canada, but there has unfortunately been no common standard of reference, and the method of expressing the values, usually in terms of arbitrary "units," has made it difficult to compare the results obtained in different countries—hence our insistence earlier in this paper that values should be stated in terms of a serum which can later be linked up with an official standard serum. In Australia, Bryce and Burnet (1932) and Connor and McKie (1933) have shown that the antihæmolytic titre is slightly above "normal" in cases of sycosis and other superficial infections; although not markedly raised in patients with boils, it may be very high when carbuncles are present; it is considerably above "normal" in deep-seated infections such as osteomyelitis, and the highest titre recorded was in a case of pyæmia. Very similar findings have been published in Germany by Gross (1933). Once again titres were hardly appreciably raised above the "normal" level in patients with boils and other superficial infections; moderately high titres were recorded in carbuncle, acute osteomyelitis, and purulent arthritis of the knee-joint; the highest titres were in cases of chronic osteomyelitis and perinephritic abscess. Gross has also stated that the presence of antilysin in serum has helped to some extent in the recognition of staphylococcal infection and in appreciating its intensity. In Canada, Dolman (1933) found that the titres in patients with boils were no more and often less than those in "normal" subjects, but he is in agreement with the Australian and Canadian workers that deep-seated infections of bone and muscle give rise to very high titres.

We have not ourselves had an opportunity of titrating large numbers of sera from human patients, but the few titrations we have made with sera from cases of superficial boils and pustular acne have shown considerable variations in titre. Similar differences in titre have, however, occurred in normal individuals.

ACTIVE IMMUNISATION WITH TOXOID

Our experiments in animals have confirmed the observations of others that the amount of circulating antitoxin can be increased by the injection of either toxin or toxoid in tracutaneously, subcutaneously, or intravenously. In Table II. are given the titres of the serum of rabbits and human subjects before and after subcutaneous injections of toxoid prepared from the Wood 46 strain.

TABLE II

Immunisation with toxoid, injected subcutaneously

Rabbits.	Total volume injected in c.cm.	Antitoxin as decimal fractions of standard serum K.		Period of observation in weeks.
		Before immun.	After immun.	
1–6	5–8	<0·003	0·01–0·02	4
7	5	0·01	0·07	
8	8	0·01	0·16	
9	8	0·01	0·16	
Human subjects.		*(Boils and other superficial infections.)*		
1	0·4	<0·003	0·02	3
2	5	<0·003	0·03	23
3	4	<0·003	0·03	18
4	0·35	<0·003	0·37	4
5	5	0·01	0·02	21
6	5	0·015	0·07	21
7	1·3	0·02	0·05	3

immun. = immunisation.

In a recent paper by Connor and McKie (1934) it is stated that the average titre of circulating antihæmolysin of a group of rabbits rose from nil to 1 in 245 following immunisation with crude toxoid. When concentrated toxoid, which is known to cause less reaction in human subjects, was injected into another group, the rise in titre was less marked—viz., from nil to 1 in 145. A third group injected with vaccines prepared from toxigenic staphylococci (unphenolised and unheated) showed a slight but still appreciable rise (from nil to 1 in 42), which may possibly in part explain the good results that sometimes follow the therapeutic use of vaccines. Our experiments have confirmed Connor and McKie's conclusions that crude toxoid is an efficient antigen.

Some of the human subjects in our series had suffered from furunculosis for some years, and had recently had one or more boils when the course was commenced; a few of our patients have ascribed the rapid disappearance of their boils to the injections. The initial dosage in this and a later group now being immunised has been 0·05 to 0·1 c.cm. of toxoid B.8300. Injections have been repeated at intervals of 4 to 7 days, the volume being increased, in the absence of reaction, in 3 or 4 injections up to 0·75 c.cm. Rather severe local reactions have been encountered in some patients, but others have tolerated 1·0 c.cm. of toxoid without discomfort, a dose which is not, however, recommended for routine use. Dolman (1933) has reported an alleviation of symptoms coinciding with the increased titre of antihæmolysin during immunisation. The rise was more pronounced where the lesions were deep-seated, in which case the titres before treatment were also higher than in patients with more superficial infections. It is possible that here we are dealing with a "secondary stimulus" response. Probably the mechanism is also at work in human subject No. 4 (Table II.), in whom the injection of only 0·35 c.cm. of toxoid has resulted in more than a hundredfold increase in circulating antitoxin. In such a subject in whom the antitoxin-producing mechanism appears to respond to a minimal stimulus, it is easy to imagine a very marked rise in antitoxin following the injection of vaccines containing only traces of toxin or toxoid. A "secondary stimulus" response has also been noticed by us in rabbits which have previously been immunised with toxoid and then allowed to rest for some months. Connor and McKie's series (1934) included 18 cases of sycosis, a condition with little tendency to spontaneous cure; in 10 there was disappearance of the lesions, and in 4 others marked improvement. In a patient with carbuncle who had a relapse, the titre which had risen from 26 to 830 "units" had fallen again to 225.

Further evidence that active immunisation with toxoid protects against infection can be deduced from animal experimentation. We have injected cultures of the Bundaberg and Wood 46 strains of staphylococcus intradermally into normal and immunised guinea-pigs and rabbits, and found a very high degree of resistance to pyogenic lesions in the skin of the immunised animals. Immunised rabbits too have survived the intravenous injection not only of many lethal doses of toxin, but also of culture; in certain instances the immunised animals have been alive and well after two months, although so high a degree of protection is unusual. In one such experiment (Table III.) the course of the septicæmia has been followed, counts having been made of the numbers

of staphylococci which appeared on plates inoculated at intervals with two drops of blood.

In both immune and normal rabbits there has been a rapid fall in the number of organisms present in the blood, but the immunised animals have shown a diminution in the degree of the septicæmia at an earlier period than in the case of the control group. Post-mortem examination of the control rabbits

TABLE III

Living culture, Wood 86 strain (20,000 million organisms) injected intravenously into rabbits immunised with toxoid

Rabbit.	Titre of serum.*	Number of colonies per 2 drops of blood.						—
		Immediately.	3 hrs.	5	23	30	48	
Immune.								
1	0·02	Numerous	32	68	2	2	0	W.N.†
2	0·015	,,	3	16	21	5	0	A.‡
3	0·01	,,	8	8	2	0	0	A.‡
Controls.								
1	<0·003	,,	184	372	D.	—	—	—
2	<0·003	,,	500	67	D.	—	—	—
3	<0·003	,,	158	77	23	0	D.	—

D. = died. * Expressed as decimal fractions of standard serum K. † W.N. = Developed wry-neck. Killed third day. ‡ A. = Alive after two months.

revealed large engorged kidneys from which films showed pus and staphylococci; in one rabbit numerous small abscesses were present, especially in the renal cortex. All the experiments carried out with actively immune animals suggest that circulating antitoxin is of value in combating infection with virulent staphylococci.

PASSIVE IMMUNISATION WITH ANTITOXIN

As with active so with passive immunisation. Rabbits, guinea-pigs, and mice can readily be protected by means of antitoxin against many lethal doses of toxin, but protection against virulent culture has in general been much less complete, the immunised animals eventually dying in most instances from pyæmic infection.

A protection experiment with potent concentrated antitoxin has recently been carried out on eight groups of four mice, 32 animals in all, using 0·6 c.cm. of a 10,000 million suspension of living virulent culture, injected intraperitoneally, as the infecting dose. Four control animals died within 24 hours, and four mice, which had received 0·05 c.cm. of serum subcutaneously seven hours before the culture injection, survived for 48 hours. With increasing doses of serum the period of survival of the groups of four mice increased, until, of the last three groups which had received 0·6, 0·8, and 1·0 c.cm. of serum respectively, three mice were still alive after one month, and 10 had lived for longer periods than 10 days.

The results of a passive protection experiment in rabbits have shown that, while control animals died as a rule in 6 to 16 hours, 11 animals which had had varying amounts of serum intravenously immediately before the intravenous injection of virulent culture survived from 4 to 30 days. Another group of six rabbits which had been injected with antitoxin intravenously 24 hours before the virulent culture in the same experiment showed even better protection, for five were still alive and well after one month. It has been rare in our experiments to get protection as complete as in this experiment.

Closely analogous results have been obtained in hæmolytic streptococcal infections in the rabbit (Parish and Okell, 1927). They showed that rabbits can be protected by antitoxic serum against acute toxæmic death following the intravenous injection of large doses of living culture of hæmolytic streptococci, but that in most instances the surviving rabbits develop arthritis towards the end of the first week or later, and eventually succumb to the pyogenic assault of the coccus. (In staphylococcal infections in the rabbit arthritis does occur, but abscess-formation in the tissues and abnormalities of the bone-marrow are more common.) But even if serum, staphylococcal as well as streptococcal, can only combat early toxæmia, there would appear to be abundant indication for its employment clinically. The evidence adduced by Panton, Valentine, and Dix (1931) lends support to this contention.

Much further work is obviously necessary to establish the value of both staphylococcal toxoid and antitoxin in clinical medicine. It is suggested that frequent titrations of the antihæmolysin present in the patient's serum, by a method similar to that described earlier in this paper, should be carried out while this research is in progress, so that valuable data may be acquired as to the precise rôle of circulating antitoxin in combating infection and influencing prognosis.

SUMMARY

1. Toxins of various strains of staphylococcus vary widely in potency. Lightly coloured variants of *aureus* strains produce more potent toxins than the parent cultures. The guinea-pig intradermic value (combining power) of toxin approximates to the hæmolytic value, when rabbit corpuscles are used.

2. A simple technique is described for titrating the antitoxin (antihæmolysin) in the serum of patients.

3. The sera of numerous laboratory animals and human subjects contain appreciable amounts of "natural" antitoxin. In human staphylococcal diseases there may be wide variations in antihæmolytic titre, the highest value being obtained in deep-seated infections—e.g., of bone and muscle.

4. Active immunisation with toxoid leads to an increase in circulating antitoxin, and affords protection against infection, at least in laboratory animals. Clinical data are accumulating, showing the value of toxoid in the treatment of subacute and chronic staphylococcal conditions in man.

5. Antitoxin protects laboratory animals passively against many lethal doses of toxin. When given to mice and rabbits before a certainly fatal dose of living culture it prolongs and in some cases saves life. It is thus a rational form of therapy in human infection, in which preliminary reports of its usefulness are not discouraging.

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A CASE OF ANAEROBIC MENINGITIS FOLLOWING MUMPS

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Brain abscess and purulent meningitis associated with anaerobic micro-organisms occur not infrequently as complications of such conditions as chronic otitis media and pulmonary abscess, and more rarely by metastasis from other sites. The following case presents certain unusual features.

CASE RECORD

The patient was an overgrown lad, aged 16, working as a shop assistant. Seven cases of mumps had occurred in his family, and he contracted the illness himself on April 15th, 1933. The attack was a severe one with persistent fever. Ten days from the onset he complained of headache and stiffness of the back of the neck but no changes in the reflexes could be determined. Kernig's sign was negative. The tongue was heavily coated but moist; the mouth was foul with marked halitosis. Pain in the neck became severe during the next three days, mainly along the posterior border of the left sternomastoid. The temperature was 100·8° F. No evidence of otitis media, furunculosis, or pulmonary involvement could be obtained throughout the illness. Apart from the temperature and the pain in the neck nothing abnormal was found at this time.

The temperature fell to 98° F. on April 30th, but during that night the patient had delirium, and on the following night a shivering attack. The pain in the neck and stiffness grew worse. On May 2nd the plantar reflex became extensor on the right and doubtful on the left. Of the abdominal reflexes only the right upper could be elicited. Other reflexes were normal, except for slight bilateral ankle-clonus. The temperature was 102° F. Two days later (May 4th) enlargement of the upper left posterior cervical glands was noticed. Both plantar reflexes were then flexor. The glandular enlargement was marked on the following day and now involved the left supraclavicular group. Slight bilateral ankle-clonus could still be elicited. During the next few days the patient became mentally confused and showed signs of cerebral irritation. Kernig's sign remained negative. There was slight "fluffiness" of both optic discs, but no definite papilloedema.

Lumbar puncture was done on May 7th, and about 10 c.cm. of turbid cerebro-spinal fluid were withdrawn. The fluid was under pressure. The patient was rational on the following day and the temperature had fallen to 99·5° F. Turbid cerebro-spinal fluid was again withdrawn but not under pressure. On May 9th there was slight head retraction, headache was less severe, and ankle-clonus was now absent. The pulse was markedly dicrotic. Lumbar puncture yielded blood-stained fluid under slight pressure. The upper part of the swelling of the left side of the neck in the suboccipital region was now fluctuating, and this was incised under nitrous oxide anæsthesia on May 10th. Much foul chocolate-coloured pus was evacuated, and the abscess cavity was found to extend down to the bone. That evening the temperature had fallen from 101° to 99° F., and the patient was quite rational. He felt fairly well during the next two days on both of which lumbar puncture was done, but on May 13th he became worse, with marked head retraction and nocturnal delirium. On the 14th he had slight periodic tremor of all four limbs. There was now spreading cellulitis of the neck and a considerable secondary hæmorrhage from the wound. 5 c.cm. of turbid cerebro-spinal fluid were withdrawn by lumbar puncture. The patient died on the following day. Post-mortem examination could not be obtained.

LABORATORY FINDINGS

Specimens of cerebro-spinal fluid were examined on May 7th, 8th, 9th, and 11th, the material being delivered at the laboratory within two hours of withdrawal by lumbar puncture. The fluid of May 7th and 8th was distinctly turbid. Examination showed white cells over 5000 per c.mm. (polymorphs, 89 per cent.; small lymphocytes, 8 per cent.; large mononuclears, 3 per cent.). Nonne Apelt phase II, positive; Fehling's solution, not reduced; chlorides, 680 mg. per 100 c.cm. No micro-organisms of any kind could be detected in stained films from the centrifuged deposit, and cultures, both aerobic and anaerobic, yielded no growth after 14 days' incubation at 37° C. The fluid of May 9th was heavily blood-stained, but no organisms were seen, and cultures from the centrifuged deposit and of the clot yielded no growth. The fluid obtained on May 11th (the day following incision of the abscess) showed the same cytology and chemical characters as those of May 7th and 8th, but now great numbers of streptococci and slender Gram-negative bacilli were present. Aerobic cultures failed to yield growth, but both organisms appeared in anaerobic culture.

The pus withdrawn from the suboccipital abscess on May 10th was chocolate coloured and very foul. Cells were practically all polymorphonuclears with much detritus. Large numbers of streptococci and slender Gram-negative sluggishly motile bacilli were seen, and these were cultivated anaerobically. Primary aerobic culture failed. Examination by dark-ground illumination was made of the deposit from the various specimens of cerebro-spinal fluid and of the pus from the abscess, but in no case were any organisms of spirochætal type seen. Inoculations for aerobic culture were made by heavy streak sowings upon slants of agar fortified by 1 per cent. human blood, 1 per cent. glucose, peptic digest blood agar (Fildes) and 5 per cent. rabbit serum agar. Anaerobic culture was made by serial dilution shake in 6" × ½" tubes containing an 8 c.cm. column of a similar range of media. Cultures were incubated at 37° C., and examined daily over a period of 14 days.

CHARACTERS OF THE MICRO-ORGANISMS

As stated, no growth was obtained in primary cultures on slants under aerobic conditions. In deep shake cultures growth appeared in from four to five days about 3 cm. from the surface. Colonies were then isolated by cutting the tubes in the usual way. The streptococci, after three or four subcultures in deep stab, came to grow readily on the surface and could then be cultivated on plates aerobically. They proved to be of *viridans* type. The bacilli, occurring as pale yellow ovoid colonies of hazy outline, were slender rods, varying in length from 4 to 12 μ, and were pointed at both ends. They exhibited no pleomorphism and were Gram-negative and non-acid-fast. Sluggish motility was observed in individuals from young colonies. Repeated examination by dark-ground illumination failed to show any spiral forms in these cultures. Similar organisms were obtained from the cerebro-spinal fluid and from the abscess pus. Growth of the bacilli in subculture was poor and failed entirely after the fourth subculture. It was not possible to carry out pathogenicity experiments on animals.

DISCUSSION

Several cases of meningitis or brain abscess associated with a mixed infection by anaerobic fusiform bacilli and cocci are noted in the literature. Von Hibler [1] describes a brain abscess in which Gram-positive cocci and anaerobic bacilli were found; Russ [2] describes an influenza-like bacillus associated with a streptococcus. Dick [3] at post-mortem examination found: (*a*) slender Gram-negative bacilli and *Streptococcus viridans* in purulent meningitis following otitis media; (*b*) fusiform bacilli and pneumococcus in basal meningitis following bronchiectasis; and (*c*) fusiform bacilli and *S. viridans* in the pus from cerebellar abscess and purulent lepto-meningitis. Ghon, Mucha, and Müller [4 5] record three different types of anaerobic bacilli found in cases of meningitis: (1) a small Gram-negative bacillus tending to

form chains; (2) a motile bacillus "resembling *B. typhosus*"; and (3) a slender motile bacillus associated with Gram-positive cocci. The fusiform bacillus isolated in the present case appears to resemble the third type of Ghon, Mucha, and Müller, and also that designated Type II. by Smith,[6] although it showed no tendency to develop spiral forms on culture as invariably found by Smith and Tunnicliff in Type II. The association of fusiform bacilli, spirochætes, vibrios, and cocci in various combinations is well known in such conditions as Vincent's angina, necrotic gingivitis, pulmonary abscess, and gangrene and chronic otitis. Spread may occur from these sites to a great variety of situations in the body either by direct extension or by metastasis, and brain abscess and purulent meningitis is not an unusual complication of these conditions. As regards the pathogenicity of these various anaerobic organisms, inoculation experiments in guinea-pigs and mice have shown that while any one of the members of the association has little or only very modified pathogenic properties, combinations of them can be made to reproduce conditions similar to those of the lesions from which the organisms were originally isolated. Smith,[7] working with various combinations of fusiform bacilli, spirochætes, vibrios, and cocci, found that only when spirochætes were present in the combination were the foul necrotic conditions of the original lesion reproduced. In the present case, although the pus from the abscess was characteristically foul, spiral forms could not be demonstrated by dark-ground illumination or on culture. Pathogenicity experiments were not carried out.

The train of symptoms in the present case suggests that pus-formation occurred first in or near the occipital bone. It is known that the organisms of the group occasionally invade bone either metastatically or directly, producing osteomyelitis with wide-spread necrosis. Seecoff [8] records a case of osteomyelitis of the frontal bone following infection of the frontal, ethmoidal, and sphenoidal sinuses by anaerobes of this group. The infection spread through the diploë and death resulted from meningitis. Silberschmidt [9] reports a metastatic abscess of the femur, and Zinserling [10] mentions direct spread from a gangrenous lung involving the destruction of several vertebræ. The external abscess in the present case was found to extend down to bone. It is significant that slight signs of intracranial involvement appeared before any swelling was detectable externally, although there was stiffness and pain at the back of the neck. The aggravation of the intracranial symptoms and the development of the external swelling proceeded more or less concurrently. It would appear that pus had formed on both aspects of the occipital bone, producing the external abscess on the one hand and an extradural abscess on the other. The earlier specimens of cerebro-spinal fluid were definitely purulent but sterile, and this is not uncommonly found with suppuration close to but not involving the meninges. Such a finding would be consistent with the presence of an extradural abscess. The final infection of the meninges indicates the rupture of this abscess internally.

The origin of the infection must remain conjectural. Autopsy was not obtained and clinical examination during the course of the illness failed to show anything definitely suggestive. It is possible that the infection originated in the mouth, which was foul throughout, but it is noteworthy that at no time was there clinical enlargement or tenderness in the anterior group of cervical glands. Fusiform bacilli and *Streptococcus viridans* have been found by Davis and Mulholland [11] and by Gilmer and Moody [12] to be the preponderant organismal association in cases of periapical abscess. In a case of anaerobic brain abscess described by Worster-Drought,[13] pyorrhœa alveolaris was the only abnormality found at post-mortem.

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COPPER STRIPS FOR SPLITTING PLASTERS

AND A PLASTER OPENING TOOL

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Plaster-of-Paris bandages are nowadays frequently applied next the skin and their removal is often a tedious process. There are numerous occasions when it is wise to split a plaster while it is still wet in order to forestall the swelling which will follow an operation or recent fracture. There must be many who have spent a wearisome hour splitting a next-the-skin plaster with a knife the day after it was applied.

There is no reason why this should not be done while the plaster is still wet provided that steps are immediately taken to maintain the close fit of the plaster until it is dry. The difficulty hitherto has been technical, because the various methods of doing it have certain disadvantages.

The time-honoured strips of lead were perhaps the best of a bad lot; while the plaster was drying, a sharp scalpel was used to cut down upon the previously inserted metal, which was then tilted slightly on its side and wriggled out of the incision. If the strips were made narrow they came out quite nicely but the knife occasionally transgressed their limits; if the strips were wider there was difficulty in getting them out of the incision without spoiling the plaster, and in both cases a sharp knife might go right through the lead unless it was so thick and heavy that it made a deep mark on the inside of the plaster.

The fingers or toes of a limb are almost always left outside the plaster-of-Paris, and consequently a strip of soft metal can be pulled straight out longitudinally after the knife has cut down upon it. This method obviates all the difficulties of the other inasmuch as we are not restricted in the width of metal used and can choose a material which is highly malleable but sufficiently resistant to a knife to be used very thin.

Soft annealed copper strips are excellent for the purpose and slide easily if they are greased with vaseline. One only is used unless a bivalved plaster is required, in which case one is laid along the front and one along the back of the limb. In the ordinary way, when plaster-of-Paris is to be applied to a limb, one of these strips is placed along its anterior aspect and secured with a few turns of plaster-of-Paris

bandage or held by an assistant. The plaster is then completed and a sharp scalpel cuts down upon the copper strip throughout its length, dividing every strand until it is clear that nothing remains bridging the gap. A bandage, plaster, or a series of webbing straps then closes the gap throughout its length and the copper strip is pulled out from one end. This is done by a metal handle which is slipped across the strip and grips it with a couple of turns before the strip is pulled out. The split plaster is now allowed to dry and need only be opened if necessity arises.

FIG. 1.—Copper strip in position. The plaster has been cut while still wet and the copper strip is about to be withdrawn.

FIG. 2.—Plaster openers.

If plaster is applied over dressings, flannel bandage, or wool, the same technique is followed except that the copper strip is then placed next this instead of next the skin.

It might be thought that a plaster would be greatly weakened by a split throughout its length, but I have not found it so and I now often use these copper strips when applying plaster-of-Paris.

Removal of the plaster is greatly facilitated by the split in the plaster and is usually the work of a few seconds if the proper plaster opener is at hand.

This is a large double-pronged lever which takes apart rather like a pair of midwifery forceps and is inserted, one pair of levers at a time, into the chink in the plaster. The two parts of the plaster opener are then locked into position and the plaster levered open. It depends on the length of the plaster whether the opener has to be inserted in more than one place, but in any event it is a simple matter to repeat the process or to use a second plaster opener higher up the limb. It will be noticed from the shape of the lower ends and their radius of action that there is no risk of the levers injuring the limb if they have once been properly inserted.

The copper strips are made in sets of four (two of 18 in. long and one each of 26 and 32 in.). They are all of the same thickness, but the width is 1 in. for the short length and 1¼ in. for the longer. Two handles are supplied with each set and they may also be used for rolling out kinks after use, though this is easily done round any circular surface such as a chair leg. If these kinks are not eliminated, the knife may miss an occasional strand of bandage and the division of the plaster be incomplete.

The plaster openers were based on a pattern which has been known in this country for some years but they now bear little resemblance to their origin. The virtue of the copper strips lies in their thinness, malleability, and resistance to a knife. Whether original or not, I venture to think the two make a useful addition to the equipment of any surgeon who works with plaster-of-Paris. Both have been made for me by Messrs. Down Bros., 21, St. Thomas's-street, S.E.1.

FIG. 3.—Method of inserting the plaster openers.

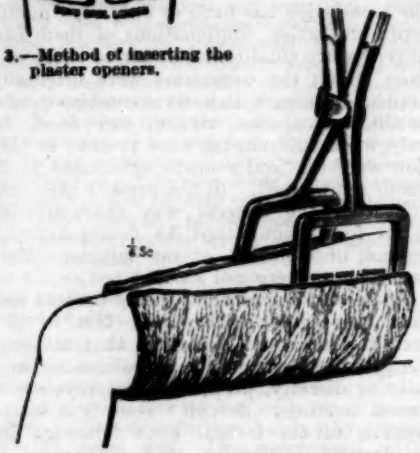

FIG. 4.—Plaster openers in action.

Clinical and Laboratory Notes

A SECOND ATTACK OF PNEUMOCOCCAL MENINGITIS

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IN December, 1932, I reported a case of pneumococcal meningitis in which the patient recovered (THE LANCET, 1932, ii., 1330). I have now to record a second attack of pneumococcal meningitis in the same patient, resulting in death. From a review of the literature it appears that recovery from pneumococcal meningitis is uncommon, only about 50 authentic cases having been described (the first by Jemma in 1896). In none of these cases is there a record of a second attack of pneumococcal meningitis, and in this respect the present case seems to be unique.

First attack.—The patient was aged 29 when the first attack of pneumococcal meningitis occurred on April 16th, 1932. The onset was abrupt, characterised by severe frontal headache. Within five hours he was unconscious, and when admitted to Prof. A. Patrick's ward in Dundee Royal Infirmary seven hours after the onset he was unconscious and violent. With intervals during which he was rational, his condition remained the same for 18 days. Then he gradually improved, and when he was discharged from hospital on June 28th he appeared to have recovered. Papilloedema, which had been severe, had subsided, and no visual defect remained. He was examined at monthly intervals thereafter and showed no sign of the disease. On Dec. 7th, 1932, lumbar puncture revealed a normal cerebro-spinal fluid. After that date he did not report again. The diagnosis had been confirmed by culture of pneumococci from the cerebro-spinal fluid.

Second attack.—The patient had been in good health since December, 1932, and had resumed his occupation as a shepherd. Occasionally he had complained of slight frontal headache.

On March 5th, 1934, he had been working during the morning. At midday he complained of severe headache of sudden onset. About 7 P.M. he became unconscious, and on admission to Dundee Royal Infirmary on the following morning he was unconscious and violent. His appearance resembled that observed at the commencement of the first attack of meningitis two years before. The cerebro-spinal fluid was turbid, under normal tension, and contained 11,300 cells per c.mm., all polymorphonuclears. Pneumococci were present in the film, and were grown in pure culture. The organism was found by Prof. W. J. Tulloch to belong to type IV. During the first attack of meningitis, lumbar puncture, performed daily, had appeared to afford relief, and it was proposed to carry out the same treatment during the present illness. His condition failed to improve, however, and he died three days after the onset of the disease on March 8th.

Post-mortem findings.—At autopsy, by Prof. D. F. Cappell, the brain was found to be soft and hyperæmic. Green purulent exudate had collected at the base of the brain and round the brain stem. A thin film of exudate covered the cortex of the cerebral hemispheres. The middle ear on both sides and the cranial sinuses were healthy. There was no evidence of lung consolidation, and there was no respiratory catarrh. No primary focus could be demonstrated which might have been responsible for infection of the meninges.

The clinical picture during the corresponding period in both attacks was similar. The abrupt onset with headache, followed within a few hours by mental excitement, restlessness, and unconsciousness, occurred in both attacks. In the first attack the cerebro-spinal fluid was less turbid, and contained fewer pus cells (1650 per c.mm., as against 11,300 in the second attack). In both no primary focus of infection could be found clinically, and in the second autopsy failed to reveal it.

I am indebted to Prof. Patrick for permission to publish the case.

CHEMICAL SPOT TEST IN DIAGNOSIS OF URÆMIA

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A TEST diagnostic of high blood-urea was devised by Weltmann and Barrenscheen,[1] who utilised the reaction between urea and p-dimethylaminobenzaldehyde (Ehrlich's reagent), which gives rise to a yellowish-green coloration of somewhat low intensity. Preparatory to applying the reagent to blood they precipitated the proteins with trichloracetic acid, and after filtering developed the colour in a clear filtrate. Blood specimens containing a normal amount of urea (20–40 mg. per 100 c.cm.) developed no perceptible colour, whereas those much above normal in respect to urea content showed the characteristic coloration, which was the more intense the higher the amount of urea present.

The reaction thus outlined, though attention was called to it by Hunt,[2] does not seem to have been employed to any large extent in this country, probably because the time and labour involved is only slightly less than some of the direct Nesslerisation or hypobromite methods, which go further in achieving a roughly quantitative estimation of blood-urea.

For several years past in this laboratory a simpler modification of the reaction has been in use and has proved invaluable in routine work. This consists merely in applying a drop of Ehrlich's reagent directly to a drop of plasma placed on a white filter paper. Where there is much nitrogen retention the spot on the filter paper shows immediately the characteristic greenish colour, no appreciable colour being present with normal or slightly raised blood-urea. More recently attention has been given to the best means of applying the spot reaction directly to whole blood, so as to provide a test which might well be done at the bedside. The technique described below, employing a composite reagent, has been found to work very satisfactorily and takes only one minute to perform on a given sample of blood.

Reagent.—To the Erhlich's reagent (10 g. p-dimethylaminobenzaldehyde, 100 c.cm. concentrated HCl, made up to a total volume of 300 c.cm. with distilled water), add 20 per cent. trichloracetic acid drop by drop with shaking until the cloudiness which forms with each drop just faintly persists.

Technique.—To a small volume of blood placed in a narrow test-tube—a few drops of oxalated finger blood will suffice—add an approximately equal volume of the reagent. Shake the mixture vigorously for a few seconds, and then pour a drop of the somewhat thick coagulum on to a white filter paper. The filtrate spreads as a gradually extending circle, leaving a brown centre of precipitated protein. Attention is then directed to that part of the spot external to the dark centre. With true uræmia the spot shows a distinct green colour. Blood specimens with normal or only slightly raised urea content show no coloration against the white background.

The subsequent development of the outer area of the spot has a certain amount of interest in a confirmatory sense. When dry the degree of yellow of a uræmia spot very slowly intensifies, and after the lapse of several hours the spot becomes a bright canary yellow. Bloods displaying little or no urea retention eventually leave only a dull pale green spot.

The test is of course no substitute for the blood-urea estimation; indeed it ought in general to be followed up by an exact determination. It is, however, eminently suitable for conditions of emergency where it is desired to ascertain at once whether or not there is gross retention of nitrogen.

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SHROPSHIRE ORTHOPÆDIC HOSPITAL.—The long task of reconstructing this institution was reported at the recent annual meeting to be making fair progress. The trustees of the James Laing Trust have given £10,000 for memorials, to form part of the building, of the late James and Nancy Laing. Last year 1328 patients were treated—787 adults and 541 children. The adults stayed on an average 118, and the children 105 days. There was a credit balance on the year of £301.

MEDICAL SOCIETIES

ROYAL SOCIETY OF MEDICINE

SECTION OF OBSTETRICS AND GYNÆCOLOGY

AT a meeting of this section on May 11th, with Dr. J. S. FAIRBAIRN in the chair, the subject of discussion was

Genital Prolapse

Mr. VICTOR BONNEY, in opening, said that the distressing charge had often been levelled against gynæcologists that no two of them held the same views about anything, and in respect to the cause of genital prolapse in women there seemed some justification for the criticism. He quoted varying views from a dozen current text-books on the matter, and submitted that the time had now arrived for a general consensus of opinion on the mechanism of prolapse. He contended that, contrary to the view underlying the expression "falling of the womb," prolapse was a purely vaginal phenomenon, one in which the uterus did not play a part; indeed the latter might constitute a hindrance to the prolapse. The vagina, in its relation to the peritoneal cavity, was best considered as a cul-de-sac which was intruded into a closed cavity the pressure within which was liable to sudden rises. The intra-abdominal pressure depended partly on the gas pressure in the intestines, partly on the muscular contraction of the parietes, and partly on the weight of the movable viscera. A perfectly free thin-walled cul-de-sac so situated would turn inside out when pressure in the closed cavity was raised sufficiently. So also would the vagina when the intraperitoneal pressure rose were it not for the ingenious mechanism evolved by nature to prevent it. Mr. Bonney regarded the cardinal ligaments as being more important in the occurrence of prolapse than the so-called pelvic floor. A mere bulging of the parietes would drag on the vagina but would not turn it inside out. He preferred the term "cardinal ligaments" to "utero-sacral ligaments." The worst cases of prolapse seen were those in women past the menopause. Prolapse manifested itself in forms which varied according to which structures were defective in the supporting architecture of the vagina, and Mr. Bonney described in detail and showed illustrations of the various operations which had been devised to deal with them. No operation, he said, was ideal which did not take into account and rectify or abrogate all the factors which were responsible for the particular deformity; hence no procedure could be regarded as a panacea for all cases.

Prof. FLETCHER SHAW directed his remarks especially to treatment. It was said that in Manchester all cases of prolapse were treated by one operation, but each case was, in fact, dealt with as its particular features required. In one case there might be more cystocele, in another more rectocele. The most important parts were those above the muscle and those attached to the muscle itself. The general principle in treatment, however, was to tighten up the parametrium and the muscle lower down to the levatores ani. It was not removal of vaginal tissue which was important, but the stitching of the deep tissues. In practically all the cases the uterus was left in an anteverted position and therefore maintained in anteversion. In the operation he did not rely on the reduction in size of the vagina by removal of vaginal mucosa, though a certain amount was removed. A factor common to every case of prolapse was some weakening of the muscular floor of the pelvis, due either to congenital or development causes, or, more commonly, to damage during labour. In most cases, however, there was an additional cause, sometimes increased abdominal pressure as in factory workers. This probably accounted for many cases seen in the north of England in virgins. The weight of a fibroid of the uterus or subinvolution of the uterus might be a factor. Prof. Fletcher Shaw said that his figures took account only of results that had persisted for at least three years. In 529 cases of operation for prolapse there were no deaths and at his hospital the unsatisfactory cases numbered only 20 (or 3·64 per cent.), and these 20 included those who experienced any symptoms at all since the operation; 5 had had subsequent confinements and 4 failed to come for further examination. In those confined again it was reasonable to suppose that the subsequent labour caused recurrence of the prolapse. Eight had some laxity of the posterior fornix very difficult to cure. During 25 years Prof. Fletcher Shaw had had 9 deaths following this operation, the causes including pneumonia, heart failure, embolism, cystitis, pyelitis. Only 27 of the women in his series had had children after the operation; the tendency was to defer the operation until they had had what they regarded as a reasonable family; 22 of them were all right, while 5 had had a recurrence. In his experience there was practically never any difficulty with subsequent labour which was mostly easier and shorter, because part of the cervix had been removed. In patients operated upon over 50 years of age there were 97 per cent. of cures; in the 4 cases not cured the disability was very slight. A number of the cured cases ranged in age from 70 to 75. In nulliparæ the cures from the operation were 96·9 per cent. The belief of himself and his colleagues was that the pelvic organs were held in place by the muscular tissue and the parametrium, and that prolapse meant that these tissues were weakened by some such cause as he had referred to. It was also their belief that all these cases could be cured by the operation which had been devised for buttressing, shortening, and firming up the tissue concerned. The results of the operation had been, in the experience of Manchester, excellent.

Prof. A. LEYLAND ROBINSON based his remarks on the assumption that descent was due to weakness of the supports of the genital apparatus, or to an increase of strain upon them. Congenital defect was fairly common; it was shown in the rapid onset of symptoms in young primiparæ after normal labour. With regard to acquired predisposition, the efficiency of the structures supporting the birth canal could be impaired in two ways: by lacerations, causing severe mechanical defects, or by muscular weakness or atrophy induced by subinvolution, the menopause, or severe debility. Any injury was, naturally, at once attended to, but loss of muscle tone might supervene after a normal delivery, or might be associated with hidden injuries, such as internal rupture of the levatores muscles. In the absence of actual injury this lowering of muscle tone was apt to be overlooked until the onset of symptoms drew attention to prolapse. In a woman with inherent muscle weakness any such factor as increased abdominal pressure, constipation, over-work, bronchitis, could initiate descent.

As to prevention, any procedure which protected the pelvic muscles from undue pressure, over-stretching,

or laceration would deter descent of uterus and vagina. The condition of the pelvic floor should have an influence in deciding as to the mode of delivery in any given case. He emphasised the importance of episiotomy for the prevention of prolapse. Pessaries were useful (1) for diagnosis, (2) as a temporary measure for healthy parous women, and (3) as a palliative. Operation the speaker regarded as curative only after the cessation of the childbearing period of life, but surgery might be needed for the repair of injuries or to relieve symptoms. He recognised two clinical groups of cases, according to whether the defect was in the middle and upper or lower supports of the birth canal. He was a firm believer in the efficiency of vaginal operations for the cure of prolapse. His experience with over a thousand cases had convinced him of the soundness of the so-called "Manchester operation," which he analysed to show its advantages. By its means the length of the vagina was increased rather than diminished, the external contours reappeared, and the normal functions of the vulva as a shock-absorber and a barrier to infection were restored to the patient.

The PRESIDENT said he considered that the method described by Prof. Robinson of tightening the utero-sacral ligaments was valuable as it avoided the tendency mentioned by Prof. Fletcher Shaw as a common cause of failure for the posterior fornix to come down.

Prof. V. B. GREEN-ARMYTAGE held that in this country gynæcologists were prone to be too conservative in these matters, and to adhere to one particular kind of operation. He thought that close adherence to the operation of the Manchester school had blinded gynæcologists to the defects and disadvantages of that procedure. In America and several continental countries prolapse cases were divided into three categories: (1) the woman with prolapse who wanted more children—for her, a modified Manchester operation without amputation of the cervix gave this possibility and made a cure; (2) the woman with prolapse who did not want more children—here the interposition operation gave excellent results; (3) the woman over 45, for whom the valuable Mayo-Ward operation could be performed; it took only 30 minutes. Prolapse in virgins under 20 years of age was one of the chief bugbears of the specialty, and he would have liked to hear particulars of the method by which Prof. Fletcher Shaw dealt with these cases.

Mr. J. M. WYATT said he did not remember to have seen a case of prolapse in a virgin under 40 years of age unless there was a fractured pelvis. As to the strain of work, he believed that young women worked as hard in London as elsewhere, yet they did not seem to suffer from prolapse due to this cause. He believed prolapse was often due to severe strain short of laceration. Sometimes after prolonged labour prolapse took place, but without any perineal tear, whereas a quicker delivery, even if accompanied by a tear, did not result in prolapse. He had seen many cases in which the prolapse was limited to the lower vagina; they were cases of low rectocele or low cystocele, and he did not think the Fothergill operation was of value in dealing with such cases.

Mr. J. CHASSAR MOIR remarked that Prof. Fletcher Shaw had described what he termed the important deep stitching to brace the uterus, and then, he said, he amputated the cervix. Dr. Moir would like to know why this last was done. It meant primary bleeding, and probably secondary bleeding at the end of a week. He had sometimes known considerable hæmorrhage occur after the Manchester operation, and would like to know how this could best be avoided.

Mr. BONNEY, in reply, said the debate had shown that the three openers were substantially in agreement, but the text-books on the subject did not reveal such harmony, or what prolapse essentially consisted of. He still did not think that the uterus had anything to do with prolapse; in fact the larger the uterus the more definite the resistance it offered to the occurrence of prolapse. Mr. Bonney did not regard the interposition operation as a good procedure. It was not an anatomical operation and was not comparable with the Fothergill, or the other operations usually performed at that site. It seemed to act partly by pulling on the cardinal ligaments, partly by reinforcing the anterior vaginal wall. Not only for the sake of patients and operators, but also that of students, he hoped agreement on the nature of genital prolapse would be attained.

Prof. FLETCHER SHAW replied that all three openers were agreed that in every case of prolapse there was a deficiency in the supporting structures, as a result of either congenital weakness or of some damage. He still thought that the weight of the uterus had some effect in bringing about prolapse, but only in the presence of such weakness as he mentioned. He thought the figures he was able to produce were sufficient justification for loyalty to the Manchester operation. He did not think the interposition operation was ever required for prolapse. In almost every case he removed the cervix but there were a few exceptions. Even if the cervix appeared to be normal, the use of sutures pushed it further down the vagina. Hæmorrhage might occur at the end of seven days, and that he regarded as evidence of sepsis. If the first indication was overlooked there might be trouble. Practically always when bleeding occurred it was from the cervix. If the urine was turbid, cystitis should always be suspected, the urine examined microscopically, and, if infected, treated before any operation was performed.

MEDICAL SOCIETY OF LONDON

As the subject for the annual oration delivered on May 14th Prof. G. E. GASK chose

Clean Wounds, Ancient and Modern

remarking that it might come as a surprise to some of his hearers to learn that modern aseptic surgery, of which we are so proud, is not entirely the product of our generation. There were at least two previous periods in past ages in which clean and rational surgery was practised. On a roll of papyrus 5000 years old which came into the possession of an American Egyptologist, Mr. Edwin Smith, during the American Civil War, was given by his daughter to the New York Historical Society in 1906, was translated by James Henry Breasted and published in 1930, is a description of 48 cases, written in a style which suggests that it was for the instruction of students. Details are given of a number of flesh wounds; the treatment being similar in all cases, it may be inferred that it was the accepted practice of the time. In the first place the wound was to be closed by stitching, and from the fact that the stitching is mentioned early and is included in the diagnosis, we may conclude that the wound was to be closed at the earliest possible moment. In the second place fresh meat was to be bound upon the wound for the first day, and for the first day only. In the third place the stitching was to be loose, the

edges of the wound being drawn together by two strips, presumably of plaster. Finally the wound was to be dressed with grease and honey every day until healed. Fresh bleeding meat is a useful styptic and may assist bactericidal action. Honey is the same as the treatment with hypertonic solution introduced by Sir Almroth Wright.

The Hippocratic method of treating wounds, said Prof. Gask, compared favourably with that of modern times. Water for washing wounds was filtered or boiled. Dressings were of new material, and the hands and nails of the operator were cleaned. Their local medications were wine and oil. As Greece declined, the Grecian school shifted to Alexandria and later to Italy. Galen, who worked in Rome about A.D. 150, was described as the founder of experimental medicine. He taught the world much, but he tried to explain everything in the light of pure theory instead of by careful observation and interpretation of facts. Some of his doctrines, accepted as gospel truth, had much to do with preventing the advancement of medical science. One of the most notable of these superstitions was the Galenic doctrine that "coction," or suppuration as we would now call it, was an essential part of the healing of wounds. This damnable doctrine was handed down from generation to generation until it was disproved by Lister.

Hugh of Lucca, known only through the works of his son, Theodoric (Teodorico Borgognoni), who completed his book on surgery in 1266, recognised that suppuration is not a necessary stage in the healing of a wound. "It is not necessary," he wrote, "to place a poultice over a suture, as the stupid do, . . . to generate pus in wounds, as almost all modern surgeons profess. No error can be greater than this. It is nothing else but to hinder nature, to prolong the disease . . . and what is worse the unskilful bring it about with their cures that flat wounds suppurate and hollow ones become fistulous." Theodoric's pupil, Henri de Mondeville, has left a vivid picture of the contemporary method of treating wounds, which he called the treatment of the ancients, adding "By this treatment more patients die than recover and the convalescence of those that survive the treatment is prolonged for three months." He himself elaborated a form of treatment of wounds and gave practical proof of the value of his treatment which must have convinced all but those who did not wish to see. These were his instructions :—

> Do not probe wounds.
> Remove all foreign bodies.
> Approximate the lips of the wound as much as possible and suture them if necessary.
> Foment afterwards with warm wine.
> Dry them with pledgets soaked in wine.
> Apply a plaster spread on a piece of tissue and cover it again with pledgets wrung out in wine.
> Bandage according to the rules of the art.

He believed and proved by experiment that suppuration was not an essential phase of healing, and that wounds properly treated "heal in a little time, without pain, and with a single dressing." But after his death his treatment fell into disuse.

Passing on to the middle of the nineteenth century, Prof. Gask invited his hearers to the small chemical laboratory attached to a brewery in Lille, where Pasteur's discovery that fermentation and putrefaction were due to the action of living organisms made possible the progress of modern surgery and preventive medicine. Lister seized on Pasteur's discovery and with it made surgery safe for humanity. He had long wondered why Lister chose such an inconvenient antiseptic as carbolic acid when he had heat ready to his hand. Lister must have had good reasons for his choice. What were they? It was in 1860 that Lister went to Glasgow Infirmary and was distressed at the frightful mortality there of suppurating wounds and the ravages of hospital gangrene. Dr. Thomas Anderson, who had studied under Berzelius and Liebig, was then regius professor of chemistry in the university. Lister and Anderson lived near each other in the West of Glasgow, and it was Anderson who called Lister's attention to Pasteur's discovery of the dependence of putrefaction on minute living organisms. Prof. Gask imagined Lister saying "If these tiny organisms are the cause of putrefaction, it is possible they are the cause of suppuration, and if one could prevent them from entering the wound one might prevent suppuration. It is worth trying." Then it would seem natural for him to turn to Anderson and ask: "How can I kill these organisms?" As a chemist Anderson was likely to think along chemical lines. A large sewage farm, recently made to the west of Carlisle, had given annoyance by its smells and carbolic acid had been found to be the most efficient preventive. Perhaps Lister made a journey to Carlisle to see for himself what was done; at all events, he secured some crude carbolic acid and began his investigations.

Had Pasteur been a surgeon he might have chosen heat as his sterilising agent. In fact, when addressing surgeons at the Académie de Médecine in 1874, he said :—

> "Surgical instruments should . . . be put through a flame . . . for this reason: if a sound were examined with a microscope, it would be seen that the surface presents grooves where dusts are harboured, which cannot be completely removed even by the most careful cleansing. Fire entirely destroys these organic dusts; in my laboratory . . . I never make use of an instrument without previously passing it through a flame."

It is easy enough for us to realise now, Prof. Gask remarked, that heat is the best method of sterilisation, but the fact remains that Lister chose a chemical disinfectant, in the first instance probably because he was told of it by his friend Dr. Anderson, and secondly perhaps because he was looking for a substance which would kill germs which were in the air, as well as those which had already settled in and contaminated the wound. In his later years Lister was filled by the idea that his work had been ineffective. He could not see the need for the modern operating theatre, with its ritual of cleanliness, and he thought the lessons he had taught were wasted. But although much has been done, still more remains to do. Though a surgeon may make a clean wound and carry out intricate operations with the certainty that healing will be swift, he is still almost powerless in the face of an infected wound. Can we say, Prof. Gask asked, that we have materially improved the treatment of pyogenic infections? Can we cure even a whitlow, or a poisoned wound, with the assurance with which we can make a clean cut?

WEST END HOSPITAL FOR NERVOUS DISEASES.—Last year there were 585 in-patients and 4000 out-patients, and income exceeded expenditure by £2596. The work of the pathological, neuro-surgical, and psycho-therapeutic departments increased substantially during the year, and the staff of the child guidance unit has been nearly doubled to deal with the demands made upon it in its first year of working. The X ray apparatus has been condemned and re-equipment will cost £1000. At the annual meeting last week Lord Harewood, the chairman, announced that the pathological department is to be named after the late Mrs. (Josephine) Marshall, of New York, "in connexion with a generous gift which is to be received from Mr. Charles Marshall and Mrs. Field."

REVIEWS AND NOTICES OF BOOKS

Rheumatism in General Practice

By MATTHEW B. RAY, D.S.O., M.D. Edin., Senior Physician, the British Red Cross Clinic for Rheumatism; Physician, the St. Marylebone General Dispensary. London: H. K. Lewis and Co., Ltd. 1934. Pp. 404. 16s.

THE development of interest in the rheumatic diseases has resulted in a glut of text-books on different aspects of the subject, though there are relatively few, anyway in the English language, which set out to cover the whole ground. Dr. Ray has succeeded in doing this in a book of quite moderate dimensions. The book is divided into two parts: the first gives a general consideration of the ætiology, clinical features, diagnosis, and treatment of these affections; the second deals with their local manifestations in the various regions of the body. The text is illustrated by six plates, five of which are X ray photographs of the hand in different forms of or different stages of arthritis with a normal hand for comparison. The preliminary chapter covers such considerations as the physiology of the skin, heat regulation, the adaptive functions of the body, the endocrine system, and so on. The next seven chapters are devoted to a detailed description of the various forms of rheumatism and arthritis. Some would criticise the space devoted to rheumatism in children, particularly the section on rheumatic heart disease. It is doubtful whether it is possible to treat usefully so big and important a subject in one chapter. The section on fibrositic affections is admirable, and the anatomical notes are most helpful. There seems no good reason for the distinction, in Chapter VII., between gout and metabolic arthritis, since Dr. Ray states—and it is the common view—that gout is a disorder of metabolism and probably an allergic condition. The two chapters on physical treatment which end the first section will be invaluable to those who are unfamiliar with the methods of physiotherapy.

In the second part of the book each region of the body is considered in turn, with the forms of arthritis that may attack it. From the point of view of diagnosis this section should be most helpful. One omission is worthy of mention. We searched in vain for an account of the so-called climacteric arthritis which has attracted much attention of late years.

This book will interest and inform all those who are interested in the rheumatic diseases. It would be even more useful to the general practitioner for whom it is designed if some expression of personal opinion, some advice on the best lines to pursue, were offered him. The conflicting views are fully and faithfully set out and the choice between them left to the reader. In this sense the book fails to give help where it is needed; in other respects it justifies Lord Horder's warm praise in the "foreword," that it is "the best account of rheumatism in our language."

The Way of all Women

By M. ESTHER HARDING, M.D., M.R.C.P. With an introduction by C. G. JUNG. London: Longmans, Green and Co. 1933. Pp. 315. 15s.

THIS books aims at interpreting the main problems of woman's life in terms of the psychological system of Dr. C. G. Jung, and it shares the disconcerting qualities of Jung's writings. An elusive intimation is conveyed, throughout, of new and valuable ideas; but the impression is blurred and our anticipations disappointed by the author's limited power of exposition. Just as the reader feels that he is about to get to the core of the argument, his comprehension is frustrated by a lapse into symbolic language, or else by the attribution of a strained ulterior meaning to such words as Truth, Reality, and Life.

Woman, according to Dr. Harding, has to pass through a naïve, a sophisticated, and a "redeemed" phase. When the uncritical victim of the instinctive forces of nature, or of the conventions of the society in which she lives, woman is in the naïve stage. The sophisticated stage characterises the woman of the world, who, intent on power or superiority, exploits men for money or for prestige, or for the satisfaction of her instincts. The flirt, the gold-digger, the scalp-hunter, and the courtesan are instances. Both naïve and sophisticated women belong to a "lower" type. What, the reader expectantly asks, distinguishes the higher or redeemed type? Several answers are given, varying in comprehensibility. Thus the redeemed type of woman is said to be characterised by having discovered a "supra-personal value," such as the ideal of liberty or fraternity, or the love of God, or the study of analytical psychology; by a new orientation of consciousness which centres itself in a non-personal region of the psyche (this non-personal quality should prevent her from using the term "I" to express the new conception of self); by allowing her libido to activate her primordial images and by taking her fantasies seriously; by allegiance to the aims of a part of her self which is in harmony with the movement of Life throughout the generations; by a "deeper" experience of feminine spirituality or Eros; also by the *Reality* of her inner experience and by her contact with inner *Truth*.

In her passage through the above-mentioned stages the woman must learn to distinguish her "individuality" (the differentiation of this entity is the keynote of the whole book) from the "anima" projected upon her by men, and from the "animus" which she herself projects on to men. The "anima" is the ideal of the perfect woman, secretly cherished by all unredeemed men; the animus serves the same function, vice versa, for the woman. We are informed, however, that at times, by a supreme effort, the animus, felt by the woman as a ghostly lover, may be changed into the "redeemed" or "spiritual" animus. These qualifying adjectives do not give us much information about the new kind of animus. How then is a woman to recognise her "redeemed animus"? By the fact, we are told, that through it she gains a relation to the masculine principle in herself, the Logos or Wisdom. "When," says Dr. Harding, "the woman is identified to the animus, she is possessed by influences and rationalisations and so-called principles which do not represent true wisdom at all. These are the work of the ghostly lover. *True* wisdom can be known only through the spiritual or redeemed animus who is a mediator between the conscious and unconscious."

Though the author's failure to clarify the philosophical assumptions of the Jungian system may be regretted, her book contains much that can be warmly praised. The chapters on Work, Friendship, Marriage, and Maternity contain many valuable ideas and useful phrases, and this is also true of those entitled "Off the Beaten Track" and "Autumn and Winter." The book is not written especially for medical readers, but it will be found useful by many of these in

affording a picture of normal psychological development which may help them to guide a certain type of neurotic and unstable female patient towards mental stability.

The Singing Voice

By E. R. GARNETT PASSE, M.R.C.S., L.R.C.P., D.L.O., B.D.Sc. With a foreword by CLIVE CAREY. London: Sir Isaac Pitman and Sons. 1933. Pp. 85. 6*s*.

Mr. Clive Carey, in a foreword to this little book, says that it has always been a debatable question as to how far a singer should possess a knowledge of the physiology of the throat, the usual contention being that such knowledge makes him "throat conscious" and is to be discouraged. In his opinion the problem is rather whether the student should learn his art by imitation and sensation alone, or whether he should obtain mastery through conscious knowledge of what he is doing; and he makes the curious remark that some knowledge of the functions of the jaw, palate, tongue, lips, and resonance chambers is necessary to enable him to experience any sensations at all. Dr. Passe begins with an elementary account of the physics of sound and of audition, proceeds to describe the anatomy and physiology of the vocal organs and their action in the production of sound, and concludes with a short chapter on their care; the most valuable part of this latter section is the warning against using the voice when the throat is inflamed. He makes a number of loose statements; some of these are amusing and unimportant, as when he says that small fishes are able to appreciate the vibrations set up in the water by the fins of other fishes of their size and species, whilst these are imperceptible to larger fishes. Others are more serious, such as the statement that the vocal cords actually touch each other all the way along their edges during phonation, and that the nasal cavity is completely shut off by the palate during the singing of vowel-sounds. His description of the mechanism of the formation of vowels and consonants is too incomplete to be of much assistance to the student of singing; indeed, Dr. Passe has been so careful throughout to avoid instruction in the details of voice-production that he has failed to inform the student on many matters which concern him. At any rate he has avoided any risk of making pupils "throat conscious" by too much knowledge.

Practitioner's Library of Medicine and Surgery

Vol. V., *Traumatic Surgery*. Associate Editor: THEODORE S. MOISE, B.A., M.D., Surgeon to the Eastern Maine General Hospital, Bangor, U.S.A. London and New York: D. Appleton-Century Company. 1934. Pp. 1080. 50*s*.

THIS volume is but one in a comprehensive series covering the whole subject of surgery, general and orthopædic. Since the aim of the series is to cater for the general practitioner, one is forced both by the scope of the work and by its bulk to consider it as a work of reference. No one outside the sphere of specialised surgery is likely to read the work as a whole. The authors of the various sections of the volume on traumatic surgery have observed to quite different degrees the idea of ready and easily accessible reference. Faced with an accident to treat, the practitioner wants to know primarily what are the symptoms pointing to serious trauma, and how far he is likely to be able to treat the case himself; secondarily, he wants to know how much can be expected for his patient from major surgical interference.

The just balance between these two aspects of the subject is nicely held in the section on traumatic surgery of the genito-urinary tract, which is, incidentally, one of the best in the book. The outlook of the practitioner is rather lost sight of in descriptions of such subjects as operations for rupture of the lesser curvature of the stomach, exploration of the bile-passages, or diagnostic blocking of the sympathetic nerve-supply to the extremities. More practical is the excellent section on pyogenic infections of the hand, with illustrations of actual cases, before and after treatment, and indications of the exact incision employed. The survey of the various types of treatment of burns is full and critical, showing finally the rationale on which the tannic acid method is based. Treatment of septic wounds by the Carrel-Dakin technique is described in detail. Compound fractures are, however, dismissed in four pages, without definite stress having been laid on the necessity of regarding these injuries as among the primary surgical emergencies. The treatment by the closed method of Winnett Orr is not mentioned. Fractures and dislocations occupy nearly 400 pages of the text, and these are not among the best sections. The accounts of fractures in particular are difficult to follow. To say that the tibia is noted for its "inability to unite following fracture" does not seem to get us much further. An illustration of a fracture of the *ulna* (p. 220) is given to show the action of the pronator quadratus in producing displacement of the fractured *radius*. It seems probable that Figs. 154, 176, and 185 are all in their wrong context. There is a curious naïvety about such a remark in a text-book as ". . . one had better call in specialised aid in order to avoid difficulties later. If complications then occur one's mind is at ease with the feeling that all care has been exercised."

In spite of the unevenness of the different sections, there is sufficient material in the volume to repay study, but its value as a work of reference is to those who already have a critical appreciation of surgical problems.

Smoke and the Atmosphere

By J. R. ASHWORTH, D.Sc. Manchester University Press. 1933. Pp. 131. 7*s*. 6*d*.

THIS is a description of experiments made by Dr. Ashworth upon atmospheric pollution in Rochdale. He describes a variety of methods which he has evolved for examining the purity of the air, and his book is certainly a record of great enthusiasm and energy in examining a subject which receives far too little attention.

Many of his experiments were made with wet deposit gauges which, as he points out, give a heavier deposit than dry gauges. The effect of size, position, and exposure of gauges is discussed and also that of wind upon the deposit obtained. The wind is credited with blowing impurities out of the dry gauge, but of failing to do so when rainwater is allowed to collect in the bottom. Dr. Ashworth favours the latter type of gauge, although the dry gauge has been standardised by the Committee for the Investigation of Atmospheric Pollution. This preference for the wet gauge gives rise to some slight discrepancies in the argument. For example, on p. 24, the deposits in Cheltenham and Wakefield are compared and

inferences are drawn which are hardly justified in view of the fact that the Cheltenham gauge was a wet one, the Wakefield gauge a standard one. Descriptions are given of the author's "horizontal gauge," which is intended to catch impurities carried horizontally; also of the "daily deposit recorder," which aims at getting the amount of deposit from hour to hour during the day; how far the results obtained by these instruments can be accepted as reliable is a matter of some doubt. It is not easy to measure a deposit as Dr. Ashworth does by simply counting, with the naked eye, the number of particles falling upon a piece of greased paper; the limitations of vision alone would cause the omission from the observed deposit of all particles except the very large ones. Such inferences as that "one million particles weigh almost exactly 1 gramme," can hardly be justified. An interesting theory is advanced to the effect that the rainfall is influenced by the quantity of atmospheric impurity; it was found that Sundays in Rochdale give a lower rainfall than weekdays. A chapter is included on the effect of pollution on light, and the author's photographic method of measuring ultra-violet light is described. There are five appendices and a list of references. The book makes interesting reading for anyone concerned with the problem of atmospheric pollution.

Prof. G. B. HASSIN informs us, in reference to the review of his book on "Histopathology of the Peripheral and Central Nervous Systems," in THE LANCET of March 17th (p. 577), that he has never claimed that hydrocephalus is caused by inability of the choroid plexus to absorb the spinal fluid.

EUGENICS IN PRACTICE

A Series of Essays suggested by the Report of the Brock Committee

II.—THE SOCIAL PROBLEM GROUP

THE most dangerous type of criminal is the one who turns in ordinary society and is accepted at his face value as a respectable citizen. So it is with defect. The potential parent who carries the seed of defect, unknown even to himself until it is too late, constitutes a more intractable problem than the individual who is outwardly and manifestly defective. This is the rock on which any proposals for sterilisation are liable to split.

A PARADOX AND ITS EXPLANATION

The evidence given before the Brock Committee goes to confirm the view that the proportion of mentally deficient persons among the parents of mentally defective children is remarkably small. Several independent investigators report that they failed to discover more than about 5 per cent. in this category. We need not search for any mysterious principle to explain this. The reason is precisely the same as that which determines why black sheep eat less than white—there are fewer of them. The ratio of defectives to carriers of defect, who much more commonly beget defective children, cannot be calculated exactly, but it is estimated to be in all probability less than 1 to 10.

It would, however, be an elementary error in logic to conclude that because defective children seldom have defective parents, therefore defective parents seldom have defective children. Yet this appears to be an inference that is not infrequently drawn. Some go further; they suppose that defect is akin to genius and that, by the sterilisation of persons liable to produce defective offspring, there would be considerable danger of robbing the world of great men. It may be pointed out in passing that such an argument would carry much greater weight if urged against milder methods of birth control practised by people who are intellectually well endowed. But in point of fact the alleged danger is exceedingly slight. On this subject also there is valuable new evidence in the Brock report. In a large sample of 3650 children born to parents at least one of whom was an ascertained defective, collected from different parts of the country, it appears that less than 1 per cent. could be classed as of superior intelligence, and over 40 per cent. were classed as defective or mentally subnormal. In another sample of about 1600 families from Merseyside, each containing a defective child, it was found that when both parents were normal 70 per cent. of the children were normal; when one parent was subnormal—including in this case the mentally retarded, the epileptic, and the insane, as well as those certified to be mentally deficient—the percentage of normal children fell to 57; and when both parents were subnormal the percentage fell to 41.

These figures indicate, and there are other strong grounds for believing, that intelligence (or the lack of it) is largely an inherited character. The first essential step, therefore, if mental deficiency is to be eliminated, is to discover some method of distinguishing the carriers of defect. Since to all appearance there is a continuous gradation of intelligence from the wise to the simple, and there is no clinical method for determining whether a borderline case is defective or not, it might seem a hopeless task to pick out the carrier. But this is not so, for though not certifiable as defective he is frequently subnormal in intelligence or comes from a subnormal class. The same investigators who are quoted in the Brock report as finding no more than 5 per cent. of defectives among the parents of defective children, state that at least 30 per cent. of the parents are persons of low intelligence. The Wood Committee, it may be recalled, discovered that a large number of defectives of the primary amentia type were found in quite a restricted group of families, a group including "a much larger proportion of insane persons, epileptics, paupers, criminals (especially recidivists), unemployables, habitual slum dwellers, prostitutes, inebriates, and other social inefficients than would a group of families not containing mental defectives." It has, in consequence, been termed the Social Problem Group, and the failure in life of the individuals who comprise the group must be attributed primarily to their poor mental endowment. It is possible, the Wood report states, that, although the majority of them are not so low-grade that they can be actually certified as defective, a not inconsiderable number might prove to be certifiable if examined by experienced medical practitioners.

ENVIRONMENT SUPPLEMENTS HEREDITY

These considerations suggest that the most fruitful soil for defect is composed of a mixture of bad environment and weak heredity. Too often in the past parties have taken opposing sides on this question and maintained that all the blame for the persistence of defect must be attributed to one or other of these

two factors. For our immediate purpose it is less important to decide, if we could, which plays the chief part than to observe that they supplement each other at every point. To say that intelligence is an inherited factor is not to imply that environment counts for nothing. On the contrary, external conditions—the kind of home in which a child is nurtured and the class of school to which he is sent—have an immense influence in moulding his mentality and in determining what he makes of his talents. The more intelligent the parents, the greater is the chance that the children also will be intelligent; on the other hand, if the parents be half-witted or mentally retarded, the less likely are the children to have an environment calculated to bring out effectively such abilities as they possess. Informed opinion, supported by the investigations of Dr. F. D. Turner and Dr. L. S. Penrose at the Royal Eastern Counties Institution at Colchester, now rather favours the view that while a small proportion of defect is due to purely external causes, and a decidedly larger proportion is due to purely hereditary causes, many, and possibly the majority of, defective cases arise from a combination of the two, in the sense that the genetic seed will only result in defective fruit given a suitable environment. Certainly, in the present state of our knowledge, it is impossible frequently to disentangle the two factors. It must be understood that "environment" here includes prenatal influences, when the condition of the parent determines the environment of the child; this would go some way to account for the prevalence of defect in the social problem group. In the Colchester investigation a systematic clinical and psychological examination of the patients, coupled with an inquiry into their family history, suggests that in 9 per cent. of the first 513 patients examined defect was due to environmental causes alone, in 29 per cent. it was due solely to heredity, while in 62 per cent. it was held to be conditioned by a combination of heredity and environment.

FERTILITY OF THE SUBNORMAL

We have seen that the carrier of defect is not usually a normal person. He is most frequently found in a group that is definitely subnormal. Add to this that like is attracted to like. The dull tend to marry the dull and defective, with the inevitable result that defect tends to be cornered and concentrated in this particular class of the community. That may not be altogether a bad thing, because it is easier to cope with defectives who are to be found in clusters and not indiscriminately scattered.

But there is another aspect of the problem that is serious. Whereas low-grade defectives are usually confined in institutions or under the care of their relatives, so that they are not free to marry and beget children, there is no such control exercised over the majority of the individuals who make up the social problem group. Nor have they sufficient intelligence, foresight, or self-control to set a limit themselves to the number of children they produce. The consequence is that the fertility of this subnormal class is much above the average fertility of the normal population.[1]

AN EXAMPLE FROM MR. LIDBETTER'S COLLECTION

A concrete example will serve better than further argument to point the moral. It is taken at random from the valuable collection of pedigrees recently issued by Mr. E. J. Lidbetter,[2] and it is undoubtedly typical of conditions with which social workers are painfully familiar, although the first generation of the families concerned is larger than the families one commonly meets to-day, even in this class. Only a part of the pedigree is reproduced and it is presented here in form somewhat different from the original, but using the author's own description where possible.

The story starts with two parents, presumably of poor mentality, for they were stated to be living in deplorable conditions and from time to time they were dependent upon public assistance. They had 15 children of whom 3 were stillborn, 5 died in infancy, 2 at four years, and 2 others under twenty. Of the remaining three, two were low-grade mental defectives, one being also an epileptic who died in the workhouse at thirty years of age. The other defective, a female (F.), married a feeble-minded man (M.), but before considering the offspring of this marriage it will be of interest to examine M.'s family history.

Here we begin with a man who was committed to prison for some minor offence and there died. His widow was on poor relief for several years. They had 14 children of whom 8 died in infancy and at least 3 were reared in poor-law schools. One of these three children, a girl of low mental order, cohabited for several years with, and subsequently married, a man who came to London from a small village in the Eastern counties. His mental state is not recorded, but one might infer from his choice of mate that his intelligence was not bright. They had 10 children of whom 5 were born before marriage. The family wandered about from place to place in East London, so that it is impossible to give a complete account of their drain on public funds, but the known and measurable periods of their chargeability to various boards of guardians amounted to nearly 10,000 days. Five of the woman's children are known to have been born in workhouses, the last of them nine years after her husband's death, and all who survived, six in number, were reared or maintained intermittently in poor-law schools. M. was one of these six children.

It seems almost criminal that this mentally deficient couple, M. and F., each coming from a stock with such a deplorable record, should be permitted to unite in wedlock. Their first child, like his father, was born in a workhouse a month after the marriage. The father indeed had spent his life in poor-law institutions except for two periods, one of five years when he was in Dr. Barnardo's Homes, and one of four and a half years when he was in the Army Labour Corps. Only for very short intervals during the later years of the record did he and his wife leave the workhouse, but their brief freedom sufficed for them to bring six children into the world. Two of the children survived and these were reared in poor-law schools. Latterly it appears that the relationship of the couple became somewhat casual: the woman disappeared but she was known to be living an immoral and uncertain life in the common lodging-houses of East London.

A PROBLEM TO BE TACKLED AT ITS SOURCE

In this example there is no evidence of organic disease. We have simply a combination of poor mentality, high fertility, and sordid conditions. It is a weak policy simply to avert our eyes from the degradation of human life and waste of public money that such conditions imply. Sooner or later the problem will have to be tackled at its source. Means must be found of discouraging from parenthood persons of the social problem type, who are more than likely to give birth to children of feeble if not defective intelligence, to be a constant drag upon the community in their turn.

The proposal of the Brock Committee that voluntary sterilisation should be permitted to any parent who has produced a defective child is one that should commend itself to all as a step, though only a small step, in the right direction.

[1] See "Differential Class Fertility," by D. Caradog Jones (Eugenics Review, 1932, xxiv., 175). Other evidence is contained in the full report of the Social Survey of Merseyside. May, 1934. Liverpool University Press. 3 vols. £2 5s.

[2] "Heredity and the Social Problem Group." London: Edward Arnold and Co. 1933.

THE LANCET

LONDON: SATURDAY, MAY 19, 1934

CENTENARY OF THE LIVERPOOL SCHOOL OF MEDICINE

IT was in 1834 that a grand old band of workers organised systematic lectures, covering eight medical and premedical subjects, in rooms belonging to the Liverpool Royal Institution; and to celebrate the foundation of this school of medicine just a hundred years ago, Prof. John Hay delivered an oration on Friday last in St. George's Hall, where the first infirmary once stood. The school from its start was coloured by its proximity to a famous port. An Act of George III. required every ship in the African trade (at that time mostly in slaves) to carry a surgeon qualified at Surgeons' Hall or by examination at a county hospital, and the infirmary had risen to the occasion by examining candidates at its monthly board meeting and passing nearly five hundred young surgeons into this service between the years 1789 and 1807.[1] Facilities for medical education at the beginning of last century were limited to schools attached to four London hospitals, no body of teachers outside the metropolis being permitted to grant degrees; nor did their lectures entitle students to enter for the examination of the Society of Apothecaries, until in 1821 this barrier against provincial teaching was broken down in Manchester, Liverpool soon following suit. At that time Liverpool was, it is said, the only town of any pre-eminence in England without one single erection or endowment for the advancement of science, and there was a chasm between the money-makers and a population of 100,000 workers packed more densely than anywhere else in Great Britain.

William Roscoe gave the lead to the select band of medical men who were not content to be absorbed in this nautical vortex. The turn of the century saw the foundation of the Athenæum, the Literary and Philosophical Society, and the Liverpool Medical Library; in 1817 was founded the Royal Institution which had among its aims that of providing lectures on chemistry, botany, anatomy, surgery, and medicine. There were not lacking other local names of outstanding merit, for it was Matthew Dobson who, in 1774, first demonstrated the presence of sugar in diabetic urine, and his colleague, Henry Park, was a pioneer in surgery of the joints. Things were made easier for medical study by the passing in 1832 of the Anatomy Act, providing an adequate supply of bodies for dissection, but not much progress was made until 1844 when the medical school was transferred from the Royal Institution to buildings erected by public subscription near the infirmary on its new site in Brownlow-street. Here the two grew up together, the school enjoying the protecting care of the infirmary. It remained, however, without endowed chairs, one faculty only with lecturers in science, until in 1874 the new regulations of the University of London compelled the council to extend its teaching of science, and this led to the establishment of University College. The sequence of events was quite different in the two great Lancashire towns. Whereas Owens College, Manchester, founded in 1851, had no faculty of medicine until 1873 when it became incorporated with the school of medicine, in Liverpool the development was in the reverse order; it was the lecturers of the medical school who took the initiative in the formation of University College, and it was the medical school of the Royal Infirmary which formed the core of the university. For many years the faculty of medicine was the most active and progressive of all the faculties. The first chair to be endowed was that of physics, first occupied by Sir Oliver Lodge, and other endowed chairs were held by such men as Campbell Brown, Herdman, Gotch, Paterson, Boyce, Sherrington, Benjamin Moore, and Ronald Ross. To match these giants on the academic side Liverpool was equally fortunate in having such clinicians as T. R. Glynn, R. Caton, W. M. Banks, F. T. Paul, W. Carter, Wm. Alexander, Rushton Parker, James Barr, and Robert Jones.

In other directions the presence of the port exerted a profound influence over the development of medicine in Liverpool, for in 1898 through the enthusiasm and foresight of Sir Alfred Jones, fortified by Sir Rubert Boyce, was founded there the first school of tropical medicine in the world. This school received its charter in 1905 with seats on the faculty of medicine. At that time there was scarcely any systematic investigation of tropical disease, the ground was almost virgin soil, and on the very first expedition Major Ross cabled from Sierra Leone on August 17th, 1899, to say that the malarial mosquito had been discovered. Next year, Dr. Annette, in Nigeria, proved the transmission of the parasite of elephantiasis by another mosquito, and up to 1914 no less than 32 expeditions were sent out to the tropics to study disease and sanitation. Another chair of which Liverpool is justifiably proud, that of biochemistry, the first in the British Isles, was created for Benjamin Moore, not only brilliant as a biochemist but possessing an infective enthusiasm. It was in his department that the *Biochemical Journal* saw the light. But the Liverpool school is not content to rest on its laurels. Disease, said Prof. Hay, is for ever taking new forms in changing conditions of life and society; the price of victory is eternal vigilance, the best defence is vigorous attack. Now is the time to strengthen the research activities of the clinical chairs and to found yet another chair in clinical science. And no doubt that will be done.

[1] Many interesting details are given in "A Brief Record of the Liverpool Medical School, 1834–1934," by Arthur A. Gemmell, M.D. (Liverpool: The University Press. Pp. 22. 1s.), based on a vice-presidential address given to the Liverpool Medical Students' Debating Society on Jan. 18th last.

THE PROMOTION OF UTERINE CONTRACTIONS

WITHIN recent years a score of papers have been published by German, French, British, and American workers concerning the mechanical recording of the contractions of the human uterus. Three devices have been used—namely, an adaptation of the electrocardiograph, secondly, an apparatus recording changes in the shape of the abdominal wall consequent on uterine contractions, and thirdly, an intra-uterine bag connected to a recording manometer. The first method has been tried by German workers but has not yielded very useful results. The second in various forms has given some useful information, while the third, obviously the most direct, has given reliable and consistent results although at the expense of discomfort, and possibly some risk, to the patient. The most recent contributions to this subject are those by F. L. ADAIR and M. E. DAVIS [1] from Chicago, and by CHASSAR MOIR [2] from this country.

The communication by the American workers appears to be an interim report on the results obtained in the limited number of cases so far examined. The experiments, in which an intra-uterine bag was used, fall into three groups: (1) those made before or during labour; (2) those made in the immediate post-partum period, and (3) those made in the later puerperium. In groups 1 and 3 the methods used were similar to those which have been described by BOURNE and BURN, and by MOIR in this country, and more generous acknowledgment might appropriately have been made to these workers; in group 2 the observations were made immediately after a low segment Cæsarean section, a hydrostatic bag having been inserted into the upper uterine segment during the operation and the attached tubing brought out through the vagina. Under these conditions the upper uterine segment was always active and would respond to oxytocic drugs, while the lower segment (into which the intra-uterine bag could be pulled) was inactive and non-responsive. This corroborates the views usually held regarding the functions of those two portions of the uterus. MOIR, on the other hand, records different results from somewhat similar experiments performed late in the puerperium. He introduced a double bag into the uterus on the seventh day of the puerperium, one portion lying in the body of the uterus and the other in the reconstituted cervical canal. It was found that contractions were recorded by both bags; in some cases these were coördinated, the cervical canal contracting about 17 seconds after the fundus and thus suggesting a peristaltic action of the uterus.

ADAIR and DAVIS, the Chicago workers, have been chiefly concerned with the action of pituitary extracts, and of drugs on the uterus before and after delivery. They are not enthusiastic about the various ergot preparations, since the records so far obtained suggest that their effects are very inconstant. Ergotamine in the form of Gynergen (better known in this country as Femergin) yielded no result when given by injection. These observations do not correspond with those of MOIR,[3] who found that contractions could be constantly recorded after injection of ergotamine or ergotoxine, and also after oral administration of B.P. liquid extract of ergot. He has recently confirmed these results,[2] and states that whereas the ergot alkaloids take half an hour or more to act after injection, liquid extract of ergot acts within a few minutes of administration by mouth. This effect is presumably due to an unidentified active principle which is present in crude ergot preparations. The action of histamine is also discussed in both papers. This substance has hitherto been held to enhance the action of the ergot alkaloids, and to be a useful addition to such drugs; BOURNE and BURN obtained tracings showing that histamine has a quick oxytocic effect on the parturient uterus. According to the present workers this is true of large doses only, as far as the puerperal uterus is concerned; when quantities small enough to avoid serious vasomotor disturbances are given (2 mg. of acid phosphate or less), the uterine action is negligible. Quinine, too, has given no certain evidence of oxytocic power on the parturient or puerperal uterus—an observation previously made by S. M. DODEK,[4] and by MOIR. Clinicians will probably feel that a fuller investigation should be made before these negative findings are accepted.

Perhaps the most interesting aspect of the work at Chicago concerns the action of the separated oxytocic and vaso-pressor principles of the posterior pituitary gland. It was found that for intravenous injection during pregnancy or in the puerperium, pituitrin, pitocin, and pitressin were equally effective. This is a remarkable observation, contrary to the findings of BOURNE and BURN [5] in their work on the uterus at term. Some variation of technique such as the use of intravenous instead of the more usual intramuscular injection may possibly account for the discrepancy in results. Unfortunately the information given by ADAIR and DAVIS on many essential details is disappointingly vague. For example, in several places the dosage of a solid substance is expressed in fluid measure without a note of the strength of the solution used; pituitary extracts are measured in minims without reference to the number of international units in the dose; and there is no indication whether the dosage of histamine is recorded in terms of the relatively heavy acid phosphate, or of the pure substance. This lack of precision makes it rather difficult to ascertain to what extent their results conflict with those obtained elsewhere. Other significant observations have, however, been made concerning the uterine action of the pituitary extracts. ROBSON,[6] working with muscle strips obtained from the human uterus at various stages

[1] Amer. Jour. Obst. and Gyn., March, 1934, p. 383.
[2] THE LANCET, 1934, April 7th, p. 739.
[3] Brit. Med. Jour., 1932, i., 1119.
[4] Surg., Gyn., and Obst., 1932, lv., 45.
[5] THE LANCET, 1928, ii., 694.
[6] Recent Advances in Sex and Reproductive Physiology 1934: London: J. and A. Churchill, p. 189.

of gestation, has shown that there are three stages of reactivity: (1) an early period when the uterus is non-reactive to both oxytocin and to vasopressin; (2) an intermediate period when the uterus reacts to vasopressin but not to oxytocin; (3) a late period when the uterus is highly reactive to oxytocin. DATNOW and JEFFCOATE have obtained somewhat similar results. Meanwhile, MOIR, using a new apparatus for recording clinically the contractions of the human non-pregnant uterus, reports [2] that there is no response to an intramuscular injection of 10 units of oxytocin, whereas a well-marked uterine spasm follows injection of 10 units of vasopressin. It is clear that the uterine action of these extracts is far more variable than their names would lead one to expect; the nature of the response appears to depend on the biological state of the organ at the time when the extracts are administered.

Pursuing further the study of the non-pregnant uterus MOIR has shown that the muscular activity varies with the stage of the menstrual cycle—the contractions, slight at first, becoming increasingly powerful towards the end of the cycle, and reaching a maximum in strength and frequency during menstruation. Hitherto gynæcologists have been chiefly interested in the cyclical changes in the structure and function of the uterine endometrium. It would now appear that a regular variation of activity takes place also in the uterine muscle. Such observations have an obvious bearing on the problems of dysmenorrhœa.

THE PROFESSIONAL MIND

LORD MACMILLAN, one of the happiest of our public orators, delivered this week the annual Maudsley lecture of the Royal Medico-Psychological Association. He chose for his subject the Professional Mind and discussed it not only to the evident enjoyment of his hearers but also to the prospective profit of a wider circle. Nobody will deny that the choice and practice of a profession visibly mould the mental outlook of men and women. In the process their habits are controlled, their thoughts are canalised, and their prejudices are developed; the very district of their activities, be it the neighbourhood of Cavendish-square or Chancery-lane, is determined by their vocation. Those who practise a particular art are drawn apart; they constitute a separate fraternity. In professional life, as in other kinds of life, there are elements good and not so good. There is material for praise wherein we may complacently take pride; but we must not expect even the most discreet and courteous of candid friends to be blind to our shortcomings and to have nothing to tell us to our advantage. Immersion in a profession has its risks. One of them, Lord MACMILLAN warns us, is the inevitable tendency to resist all change. Having painfully mastered a system, we are disinclined to scrap what we have found to work well enough. It is not easy to make the effort to examine new ideas which may prove uncomfortably subversive. A century ago, we are told, the Admiralty felt it to be its duty to discourage the introduction of steam as calculated to strike a fatal blow at the naval supremacy of the Empire. Has the history of medicine no instances of a similar conservatism? Another danger of the professional outlook is the proneness to prefer the interests of the craft to the interests of the community. ADAM SMITH indeed looked with profound suspicion upon professional and trading corporations. "People of the same trade," he observed, "seldom meet together even for merriment and diversion, but the conversation ends in a conspiracy against the public or in some contrivance to raise prices." Citing this gloomy comment by his great compatriot, Lord MACMILLAN wonders what SMITH would have thought of the innumerable congresses and conferences nowadays held by every trade and calling. "I am afraid," he adds, "he would often find in a perusal of their proceedings little to dispel the truth of his indictment." Yet the community never needed the expert so much as now. In the planning of industry, whether it be coal-mining or agriculture, in the coördination of facilities, whether it be water-supply or London transport, there is a demand for the expert to be put in charge. The experts are not, however, unanimous, nor are they infallible. The faith of the public in political economists, for example, has, as Lord MACMILLAN says, been rudely shaken by the discordant advice which they have tendered since the war for the treatment of the ailments of the body politic. Post-war or pre-war, the Adam Smiths no longer have things all their own way.

To the professions of medicine and of law, producing perhaps a comparable type of mind, Lord MACMILLAN devoted special attention. The lawyers, he confesses, are sometimes accused of sacrificing conscience to advocacy, of thriving in an atmosphere of forensic red herrings and of overworking their faculty of making the worse appear the better reason. While not blind to the elements of truth in the popular caricature, he still can claim with confidence that the practice of the law has no deteriorating effect on the moral character. The great bulk of the legal work of the country, he says, is non-contentious; it requires for its successful performance no perverse intellectual subtlety but simply the ordinary workaday virtues of industry and honesty. Lawyers, he admits, tend to be preoccupied with words, to worship a formula, to value an argument not so much for its essential soundness as for its convenience of statement. They tend too to cynicism and to criticism of a merely destructive sort. "This critical habit is a useful quality in its proper place but it often handicaps the lawyer in dealing with constructive proposals where success can be attained only by disregarding risks. And so lawyers are not temperamentally well-fitted for leadership either in politics or in business, in both of which spheres an adventurous spirit is essential; they may be admirable in deliberation, they are not so useful in action." If the lecturer discreetly refrained from naming twentieth century examples, some of his hearers probably allowed themselves a greater licence in secret. An audience of doctors

indeed might make bold to remember that, while the post-war period has piled up special difficulties for the Ministries of Health and Agriculture, two of the most vigorous and constructive of our political leaders have been members of the medical profession.

Turning to a study of the doctors, Lord MACMILLAN acknowledged that their relations with their patients reveal an intimacy which no other profession attains, and that diagnosis requires not only knowledge but also reasoning power and imagination. Personality, again, counts for much in medical practice; the mere presence of the trusted medical adviser inspires confidence and has its own therapeutic value. The exacting nature of the work, the irregular hours, and the frequent interruptions of ordinary social life are other forces which, making their demand upon the whole physical, mental, and emotional resources of the doctor, create a special type of character. The type, Lord MACMILLAN reminded his audience, is exemplified in the highest degree in those who are called to minister to minds diseased—a region of practice where psychological factors necessarily predominate. What is that type, or rather perhaps what should it be? The lecturer made no attempt to preach a lay sermon on medical ethics. He merely gave us for the moment the gift to see ourselves as others see us. Despite his continual contact with suffering, the doctor, as Lord MACMILLAN sees him, is not callous. He must acquire a certain calmness in the presence of life's emergencies and tragedies which is not to be mistaken for unconcern. Despite the confidence reposed in him, he will resist the temptation to be professionally oracular. Despite his habit of setting out prescriptions in hieroglyphics, he will remember to avoid the obscurantism of spells and incantations. Foibles can be laid to the charge of his vocation; they are to be outweighed by the unselfishness and devotion to duty which Lord MACMILLAN generously describes as the very hall-mark of the medical profession. "It is perhaps in the medical man," he concluded, "that the professional mind finds its finest flower." Though we may feel the praise to be too charitable, we can thank him warmly for a stimulating re-statement of the ideal.

ANNOTATIONS

ROYAL SOCIETY CONVERSAZIONE

THERE were 51 exhibits at Burlington House on the evening of May 9th illustrating, it is said, the most recent advances in pure and applied science, but affording a still better illustration of the fact that the exhibitor may be of as much interest as the exhibit. It is one of the attractions of the evening that those who explain the advances have contributed in large measure to the advance. There were, it is true, only two exhibits bearing directly on medical practice, although few, if any, had not some indirect relation to it. Exhibit 15 consisted of bed bugs to illustrate the possibility of their control by fumigation when furniture is in transit from old slums to new estates. Exhibit 31 was a model of the simple apparatus for artificial respiration which kept a patient alive for two years in the account given in our own columns on April 14th, p. 786. The physiologist had an opportunity of seeing a successful attempt to keep electric responses from a nerve constant during stimulation by condenser discharges; he could follow the detection of acetylcholine by its action in extremely low concentration on different kinds of isolated muscle. The pathologist was shown the coccoid organism responsible for psittacosis and the cytoplasmic inclusions seen in other virus diseases such as canary pox and dog distemper. A demonstration was given on a microscope for ultra-violet photography in which the optical parts must be standardised with such care that they are interchangeable. Those with a historical turn were shown the first telescope with an erecting eye-piece made by Maria de Rheite and dated 1646; the magnification is about 21 and the telescope is in its original condition and still perfect. They were also told the story of the automatic microtome devised by undergraduates at Cambridge in 1882 and still the basis of the famous "rocker." Geneticists could see a remarkable race of oat plants having 41 instead of the normal 42 chromosomes, producing progeny 88 per cent. albino and incapable of living more than a few weeks; also how irradiation might produce breakage and fusion of chromosomes in locusts, resulting in many-tailed sperms. The physicist was shown the apparatus for photographing a lightning flash no matter what its speed, and the means for determining the length of the metre and the yard in terms of wave-lengths of light. And finally all who go down to the sea were gladdened by an exhibit by the Admiralty Chemical Service of a means for salvaging waste oil and so avoiding the terrible mortality of marine birds. Altogether it was an exhibition to stimulate the imagination.

OPERATION IN PNEUMOCOCCAL PERITONITIS

No final answer has yet been given to the question whether or not operation is the best treatment for cases of pneumococcal peritonitis. Against surgical intervention it has been argued that it is not only dangerous and characterised by a high post-operative mortality, but is also useless because it is not possible to remove the cause of the infection. MM. Loutsch and Mérigot have recently challenged [1] the basis of these arguments, although they admit that the main reason for operative treatment is the extreme difficulty, often amounting to impossibility, of deciding between peritonitis due to appendicitis and pneumococcal peritonitis. This is where the argument is apt to end in practice. Loutsch and Mérigot have been at some pains to analyse the signs and symptoms of pneumococcal peritonitis in ten cases which have come under their care in the Hôpital Trousseau. No sign or symptom was found which proved of any constant value. Herpes of the mouth was an important sign when present, as was vulvitis. Diarrhœa they do not consider pathognomonic, although it was present in several cases. Generalised abdominal pain is not of much value, as quite often the maximum pain was referred to the right iliac fossa, and there was no sign elicited by examination that was of any particular assistance. The most characteristic finding in these ten cases seems to have been the profound illness of the children. Every case has some such observation as "general condition grave," "cyanosis," "respira-

[1] Presse Méd., March 31st, p. 517

tion quick," and the pulse-rate varied between 120–150. One characteristic sign, not mentioned by these authors, but which may prove of great value in diagnosis is the grunting nature of the respirations. This is apparently a sign of pneumococcal septicæmia, as it is present in pneumonia, as well as in pneumococcal peritonitis. But if it is hard to determine whether operation will do any good, Loutsch and Mérigot find no reason to suppose that it influences the prognosis for the worse. The mortality is admittedly high (they give it as 30–50 per cent.), but this they consider is attributable to the nature of the disease. Their observations on the course of the illness have led them to recognise a critical period between the 10th–15th days, and, in common with other observers, they distinguish a type of case in which peritonitis is but one of several manifestations of a generalised disease. These cases have a very serious prognosis. Answering the contention that operation (by which they really mean drainage of the peritoneal cavity) is useless, they quote observations of their own to show that improvement in general condition followed free evacuation of pus. To say that operation is futile if one does not remove the source of the infection is no more valid here than in many other diseases in which drainage is of proved value. Even before pus has formed they advocate peritoneal drainage, for pus may drain away later. With the more vital objection that so-called drainage of the peritoneal cavity drains only a small cavity around the tube, they do not deal, nor do they consider the view that late drainage of pus may be due to secondary infection of the depths of the wound from outside. The question resolves itself, as it always does, into whether it is possible to exclude acute appendicitis, and whether, in operating to settle the diagnosis, we are prejudicing the chances of recovery in the case of pneumococcal peritonitis. Loutsch and Mérigot would operate.

EPIDEMIC VERTIGO

Dr. Stefan Vatev, who holds the chair of pædiatrics at Sofia, has recently described [1] epidemic vertigo as he has seen it himself in Bulgaria, and his account confirms in its main features that given in our correspondence columns a few months ago by Dr. Otto Leyton.[2] In the autumn of 1929 Dr. Vatev began to see cases of a peculiar disturbance of consciousness, best covered, he thought, by the term vertigo, attended with a characteristic group of accompanying symptoms. The onset was sudden, the duration several days or weeks, the victims as a rule being able to go about their work the whole time. In three years he saw 146 such cases—62 males, 84 females, at all ages—without predilection for occupation, although six doctors were among the number. As a typical example he tells of a doctor, aged 65, who in February, 1930, became suddenly aware of giddiness on moving his head when recumbent. The giddiness was accompanied by a feeling of heaviness in the stomach and twice he vomited before rising in the morning. He was apt to feel giddy on rising from his seat or on bending his neck to auscultate; he had occasional palpitation with no alteration of blood pressure; he complained now and then of headache, especially in the forehead, was troubled with polyuria chiefly at night, with no qualitative alteration in the urine. The attacks lasted three months and then disappeared, along with the cardiac irregularity; four months later he had left-sided hemianopia lasting a month. He tried all kinds of drugs without appreciable effect, except that aspirin relieved the nocturnal polyuria. In this doctor's household his mother-in-law had similar but slighter symptoms lasting a fortnight in May, 1930, repeated again in November. His 20-year-old daughter had slight vertigo, pain in the neck, heaviness in the stomach, and nausea, the symptoms only present on getting up in the morning and lasting two months. In October the doctor's wife had attacks of vertigo when recumbent at night, accompanied by radiating pains over the heart. Two sons of 22 and 27 were the only members of the household who escaped. The other cases were of much the same character, often occurring in groups; the vertigo mostly coming on at night or at all events in the recumbent position, and rarely preventing the subject getting about. In a few cases there was complaint of definite loss of consciousness not lasting more than a few seconds but giving rise to a feeling of insecurity. Headache was frequent but only severe in nine cases of which a few had hemicrania. Some patients complained of muscular cramp during sleep, others of myalgia. Dr. Vatev remarks that a rise of temperature had no effect on the severity or the frequency of the vertigo; even when influenza was prevalent in the spring of 1931 the cases of vertigo kept on occurring without relation to it. In no case did the attack leave any sequel. Diminished patellar reflexes were noticed in some cases. Both epilepsy and hysteria could be definitely excluded. The occurrence of the disease in groups led Dr. Vatev to regard it as an infection with a specific neurotropic virus, but as to where it enters the body and how it produces its effect he ventures no opinion except that the probable port of entry is the nose and throat.

[1] Deut. med. Woch., Feb. 2nd, p. 167.
[2] THE LANCET, 1933, ii., 1932, and Jan. 13th, p. 107.

THE MICROSCOPY OF VIRUSES

THERE is abundant evidence that the larger filtrable viruses can be seen with the microscope. Recent work with vaccinia, fowl-pox, psittacosis, and ectromelia fully justifies such a statement. Not only can formed elements be seen in stained preparations of virulent material, but these virus particles can be freed from extraneous material by differential centrifugation or ultrafiltration and shown to be both virulent and susceptible of specific agglutination. Only the ultraphilosophic remain reluctant to abandon the possibility of these particles being merely the inert carriers of an unorganised virus, and their attitude is hard to understand, particularly when one recalls that Barnard's findings with ultra-violet dark-ground microscopy have shown the particles to have definite structure.

This line of virus research it now being actively pursued in Japan, and in two recent papers [1] [2] Taniguchi and his associates describe new methods of staining and the fruits of their application to the study of the viruses of vaccinia, fowl-pox, molluscum contagiosum, varicella, herpes simplex, and zoster. So far, however, it cannot be said that the work substantially advances our knowledge; even the method of staining, which depends on mordanting with an acid dye like eosin, has already been suggested by Craigie.[3] Moreover, some of the conclusions arrived at in the first paper are open to question. The virus of varicella was studied in rabbits—a species whose susceptibility to this virus has never been established—so that the conclusions that it multiplies

[1] Taniguchi, T., Hosokawa, M., Kuga, S., and Fugino, T.: Japan Jour. Exp. Med., 1934, xii., 91.
[2] Taniguchi, Hosokawa, Kuga, and Masuda, Z.: Ibid., 1934, xii., 101.
[3] Craigie, J.: Jour. Path. and Bact., 1933, xxxvi., 185.

in the cytoplasm of infected cells can only be accepted with caution. The statement, too, that the viruses of fowl-pox and molluscum multiply preferably in the nucleus is almost certainly incorrect; even two out of three of the authors' illustrations, viz., Fig. 3, of cells infected with fowl-pox virus show the inclusion in the cytoplasm, while the third is so indefinite as to leave one in doubt as to whether one is dealing with a virus inclusion or not. The second paper is devoted to the viruses of herpes simplex and zoster. Here again there is evidence of unfamiliarity with published work. The claim to priority in the discovery of zoster elementary bodies ignores the fact that Paschen[4] has described and figured these bodies, and the estimate of 0·25 μ for the size of herpes simplex is not in keeping with the work of Bedson[5] and Elford, Perdrau, and Smith[6] to which no reference is made. It is unfortunate that the enthusiasm of the Japanese investigators should not have been tempered by fuller knowledge of what has been done elsewhere.

THE R.I.P.H. AT NORWICH

THE annual conference of the Royal Institute of Public Health, held under ideal conditions at Norwich during the present week, was opened by a remarkable address from the President, ex-Lord Mayor Henry M. Holmes, on the conditions of employment in that city over a period of six hundred years. Norwich rose to prosperity when Edward III. and his Queen brought Flemish weavers to initiate the trade in wool and worsted, which remained the staple industry until the machine loom in the industrial north spoiled the market for handmade goods, when even the weavers themselves could not afford to buy their own produce. In the sixteenth century Flemish refugees introduced the dyeing and printing of fabrics along with new forms of weaving, and prosperity was accompanied by a high sense of social hygiene, for the city had a piped supply of water to the market as well as to private houses and it is recorded that the streets were so well kept that they maintained the health of the citizens and won the praise of strangers. Still in the eighteenth century Norwich was without a rival in the art of dyeing, and worsted fabrics were sent there from all parts of the country to be dyed and finished. Even children from six to ten years "gained twelve thousand pounds more than what they spend and that chiefly by knitting fine jersey stockins"; every weaver too had a goose for his Sunday dinner. When industrial prosperity declined in the early nineteenth century the public health also ebbed; streets were badly paved and lighted, with an almost complete lack of drainage, courts were the dumping ground for refuse, and in the worst neighbourhoods there was little water as the tenants could not, and the landlords would not, pay for it. Later in the century the familiar tenacity of Norwich folk reasserted itself and the making of boots and shoes again brought prosperity to the city, which even dictated the fashion in light shoes. Edible and household commodities of all kinds were manufactured at Carrow, and Norwich became emphatically a town of mixed industry, although maintaining some of the characteristics of a mediæval city. At the conclusion of his address Mr. Holmes gave illustrations of the high degree of social welfare among the present-day workers, of a vast scheme of municipal housing, and of the development of public services by which, in the words of a handbook recently issued for tenants on the housing estates, "the ratepayer can be born in a municipal maternity home, cared for in a creche, and be educated, doctored and generally reared in a public elementary school, supported during his manhood in time of need, and buried in a public cemetery." The conference was honoured by the presence of Sir Charles Sherrington, who was awarded the Harben gold medal for distinguished service in physiology.

"OCCUPATION AND HEALTH"

THE final number has just been issued by the International Labour Office at Geneva of the English edition of the valuable encyclopædia, entitled Occupation and Health,[1] which has been appearing in brochure form at irregular intervals for the past ten or twelve years. The completed work consists of 353 articles, each contributed by an expert of international standing. It appears in English and French editions; as the articles were written originally by the authors in their own languages, often using terminology peculiar to some unique trade process, the task of translating such highly technical descriptions, together with pathological findings, has called for expert translators who have carried out their difficult work with great care. For example, only familiarity with the intricacies of metal smelting and with recent studies of pulmonary pathology could have enabled the last article in the series which deals with zinc to be successfully translated. The plan of the book is this. In each instance industrial usage and processes are described with explanations of exposures to hazards, whether from some toxic agent or bodily strain; then follow sickness records and pathological descriptions with preventive measures and treatment, concluding with legislation. Some idea of the scope of the whole may be gathered from the subjects covered in this last brochure: transport industry, tripe and gut works, tungsten, turpentine, uranium, vanadium, varnishes and lacquers, welfare workers, wine and spirit industry, xylene, zinc. In 36 pages are considered the risks of transport, whether by rail, tramway, or load carrying; information has been gathered from Italy, Australia, U.S.A., Great Britain, Russia, France, Switzerland, Germany, Japan, Argentine, and Chili. The value of such a work for reference needs no emphasis.

DEFENCE AGAINST STAPHYLOCOCCI

THE paper by Dr. Parish and his colleagues on another page of this issue draws attention once more to the properties of staphylococcal toxin and toxoid. It is shown that in laboratory animals injection of these substances will increase the amount of antitoxin in the serum, and that the presence of this antitoxin is of real value in combating infection with the living staphylococcus. It is also shown that the use of toxoid in man leads to an increase in the amount of circulating antitoxin; the clinical results, however, are left somewhat vague. It is unfortunately true that, although many accounts of such treatment have been published in the last few years, its value is still uncertain. This is evident, for example, from two reports which have appeared in the last few weeks. In the first, D. J. Kindel and M. J. Costello[2] describe the effects of treating a mixed series of skin infections with toxoid; more than half of the cases were diagnosed as acne vulgaris and the results were naturally disappointing. In the second, J. A. Gilchrist

[4] Paschen, E.: Zentralbl. f. Bakt., 1933 (Orig.), cxxx., 190.
[5] Bedson, S. P.: Brit. Jour. Exp. Path., 1927, viii., 470.
[6] Elford, W. J., Perdrau, J. R., and Smith, W.: Jour. Path. and Bact., 1933, xxxvi., 49.

[1] Encyclopædia of Hygiene, Pathology, and Social Welfare. Geneva: International Labour Office. (London office, 12, Victoria-street, S.W.1.) Complete in two volumes, paper £3 3s., cloth £3 10s.
[2] Jour. Amer. Med. Assoc., April 21st, 1934, p. 1288.

and Mary J. Wilson[3] associate the incidence of diabetes mellitus with staphylococcal infection, particularly of the nasal sinuses, in many of their patients, and record cases in which treatment with toxoid has enabled them to dispense with the use of insulin.

In view of the misery caused by "trivial" but recurrent staphylococcal infection, and the potent effects in animals of modern preparations of toxin, the time seems to have come when a full investigation should be made into the effects of toxoid treatment in the various types of this infection. In such an investigation the use of a standard technique for the estimation of antitoxin, such as that quoted by Parish, O'Meara, and Clark, would probably be essential. Their paper is, however, open to criticism on a point which may be of real importance—namely, that it ignores the presence in toxin of a leucocidin capable of attacking human phagocytes. There is evidence suggesting that the production of leucocidin by different strains of cocci varies independently of the production of hæmolysin and necrosing toxin, and that the former property runs parallel with the severity of the human lesion from which the strain was isolated, whereas the latter does not. If this is true, the toxoid used clinically ought to be prepared from toxin in which both factors are present.

THE CONTROL OF BODY TEMPERATURE

THE recent advent into therapeutics of artificial pyrexia brings into prominence the question of the normal control of body temperature. Although the principles of this are fairly well understood, it is probable that new lines of investigation will have to be explored before the implications of electro-pyrexia can be fully worked out. It is known that a steady temperature is maintained by an exact balance of heat production and heat loss, both of which seem to be under reflex control. It is convenient to regard heat as a by-product of muscular contraction; the contractile machine is not a perfect one, and mechanical energy can only be obtained from food at the expense of considerable wastage in the form of heat. During severe exercise the body must rid itself of this heat as best it can; an individual walking at five miles an hour may have to get rid of seven times as much heat as if seated. The body at rest is faced with a different problem, that of ensuring a degree of general muscular contraction sufficient to prevent its temperature from falling. This it does by adjusting the tone of the muscles; the "relaxing" qualities of warm air and the "bracing" effect of cold are commonplaces, while shivering may be regarded as an extreme form of involuntary muscular action called into play when simple increase of tone becomes insufficient. Of the significance of heat produced by the activity of other tissues we know little.

In heat loss by far the most important organ concerned is the skin, which is cooled partly by radiation and conduction, partly by evaporation. The former is controlled voluntarily by clothing, involuntarily by the amount of blood allowed to flow through the cutaneous vessels, and is naturally influenced by the temperature and movement of the surrounding air. The latter is controlled involuntarily by the activity of the sweat glands, and is profoundly affected by the humidity and movement of the atmosphere. Of the two, evaporation is more important during exercise and at high external temperatures; and radiation and conduction are more important at rest. Under normal conditions production and loss are balanced one against the other and may be called into play reciprocally. This dual control is important in relation to internal as well as external conditions. Far more fuel may be supplied to the body at one time than at another. If an excessive amount is taken as much as possible must be stored as carbohydrate and fat, and the surplus heat produced by the compulsory oxidation of the remainder (usually protein) eliminated via the skin. Conversely, insufficient fuel must be compensated by a call on stored food and even on the tissues themselves. All this is automatic, but a realisation of the underlying principles is important in arranging diet and clothing when there may be exposure to extreme climatic conditions; the tragic end of Scott's last antarctic expedition was due in part to the failure to realise the disproportionate amount of food needed to maintain body temperature over and above that required for strenuous work.

The balance of heat income and expenditure is clearly a matter of delicate reflex control, and it is not surprising that diurnal variations occur, nor that the body temperature rises during muscular exercise; it is in fact doubtful whether these are due to "failure" of control, or whether they serve some useful purpose. The menstrual fall of temperature in women, together with many animal experiments, points to the participation of the ductless glands in the process. A consideration of variations above and below the conventional "normal" temperature brings us to a further question. Once we have admitted that the balance between production and loss is not always machine-like and precise, we are forced to postulate some supreme entity which fixes the mean level and dictates how much ground must be ceded or regained at any given time in order to return to it. This function is attributed to a "temperature regulating centre" whose location is a matter of doubt; removal of parts of the brain in animals from above downwards indicates that it is higher than the mid-brain, and the corpus striatum has now given place to the hypothalamus as its most probable site. The reason why the mammalian temperature should have to be maintained about the level of 38° C. is a matter for speculation; in the course of the ages the sea must have passed this point in cooling to its present temperature, and its passage may represent a critical period in the history of warm-blooded animals.

The point of immediate interest is not, however, the normal temperature, but the limits which are compatible with life. From data given by F. Vlès[1] for a number of animal types, including some marine organisms, the commonest lethal temperature appears to lie between 38° C. and 45° C.; that of the dog, the only mammal mentioned, is 44°–45° C. which fits in with general experience in the human subject; yet some tropical animals have a normal temperature higher than this. In general animals have narrower limits than plants, and highly organised animals the narrowest of all. A list of common bacteria shows that these can withstand for a short time temperatures ranging from 54°–70° C., while some spore-forming varieties are not killed by temperatures well over 100° C. Dehydration (as in spore-formation) is shown by other examples to confer a great immunity to high temperatures. The *Treponema pallidum*, however, as previously noted in these columns[2] succumbs after exposure to 42° C. for one hour. The lower limits of temperature show a much wider variation; bacteria and seeds have been reduced to temperatures in the region of — 200° C. without being killed. For other plants about — 17° C. is fatal; for

[3] Canad. Med. Assoc. Jour., April, 1934, p. 353.

[1] Roger and Binet: Traité de physiologie normale et pathologique. Paris: Masson et Cie. Pp. 895, et seq.

[2] THE LANCET, March 31st, p. 695.

some fish and frogs about − 3° C.; for macaques + 14° C. and for man + 24° C. It should be emphasised that all these temperatures refer to actual tissues and not to the surrounding medium; the length of time for which they can be withstood is not given in all cases, but a sufficiently clear idea is obtained for comparative purposes. Vlès himself writes:—

"It seems that the temperature of coagulation of the protoplasmic colloids determines the irreversible thermal limit; but in reality disturbances are manifested long before the temperature of gross coagulation of the isolated proteins is reached. A whole series of physico-chemical mechanisms is affected by a rise of temperature . . . electrolytic dissociation . . . viscosity . . . colloid equilibrium and permeability . . ."

Liquefaction of fats and lipoids may occur, mitochondria may disappear, and marked change of reaction may supervene as a result of interference with the tension of carbon dioxide and its equilibrium with bicarbonate.

In addition to this there is the probability of establishing a vicious circle; increase of temperature stimulates metabolism, and this in itself produces internal heat. Although poikilothermic animals may have a rudimentary temperature control, directed in the main to combating low temperatures, it is unlikely that this is vested in the individual cells or tissues; as in warm-blooded animals it is probably a reflex phenomenon in which the animal as a whole is concerned. In other words, the passively heated tissue is not only defenceless, but even assists in its own destruction.

FOOD STANDARDS

THE British housewife, although she may not have much knowledge of the principles of nutrition, makes her purchases with considerable skill, having regard to the dietary, tastes, and customs of different parts of the country. This we have on the authority of a departmental committee on the composition and description of food which has just reported [1] to the departments of health. And her choice is no doubt made easier by the fact, duly noted in the report, that a large proportion of the food manufactured in this country reaches a high standard of quality. Nevertheless the absence of definition does give rise to difficulties to consumers and administrators as well as to public analysts. The composition of certain articles of food is already regulated by law—e.g., spirits, flour, bread, butter, margarine, condensed and dried milks; and owing to this no doubt is the observation that the term butter has the same meaning in commerce to-day as it had fifty years ago, whereas toffee is no longer a sweetmeat prepared from butter and sugar—even if, as the committee suggests, purchasers are still getting what they want. The purchaser of cheese or cream gets articles with varying proportions of fat, for there is no statutory limit in either case. The position is vastly different in some of the Dominions where in South Africa, for instance, the number of food articles with exact legal definition and standard is about 50, and in Canada at least three times as great. The committee was asked to consider: "whether it is desirable that the law relating to the composition and description of articles of food should be altered so as to enable definitions or standards to be prescribed, or declarations of composition to be required, for articles of food other than liquid milk; and if so to recommend what alterations of the law are required."

[1] Report of the Departmental Committee on the Composition and Description of Food. Cmd. 4564. H.M. Stationery Office. Pp. 18. 3d.

On this main question the committee reports that it is desirable that the law should be altered in the way suggested, the enabling power being vested in the Ministry of Health for England and the Department of Health for Scotland. It does not consider that a case has been made out for the extension of standards or definitions to all articles of food. The Society of Public Analysts and a number of other witnesses were in favour of having a permanent advisory committee to assist the Minister in the use of his powers. This recommendation was rejected and it is presumably to be left to the food department of the Ministry of Health to advise on the legislation required. Mention is made of informal conferences with manufacturers and other interests, but many close students of affairs will find this a poor substitute for an advisory committee, representative of all interests, which would not only advise but, if the need arose, stimulate to activity the government department. The need for some outside assistance is admitted in the report, where the suggestion is made that in case of wide divergence of view between the parties interested or special difficulty in arriving at a decision, the matter should be referred to a committee of three independent persons who would hear evidence and report to the Minister.

Some secondary points of considerable importance are discussed in the report. Foods specially offered for infants and invalids should bear on the label of the package containing them a declaration of their contents. Misleading food advertisements and food labels are dealt with by the suggestion that for purposes of evidence as to the nature, quality, and substance demanded of a food specific claims made in advertisements should be deemed to be part of the package label. Many purchasers buy not on a label but on the assertions in the advertisement. The immense development of pre-packed articles demands a change in the law, and the report recommends that the primary responsibility under the law should be transferred to the packer and that the retailer (where he is not the packer) should be absolved from proceedings if he can show that he sold the article in the same condition as he received it and took adequate steps to protect it during storage. Such an alteration of law, with its consequent changes as to sampling, will save much waste of time to sampling authorities and irritation to retailers.

THE next session of the General Medical Council will commence at 2 P.M. on Tuesday, May 29th, under the presidency of Sir Norman Walker.

WE regret to announce the death of Dr. David Ogilvy, medical superintendent of the London County Council Mental Hospital at Epsom, which occurred on May 13th, at Longrove House, Epsom.

THE series of articles on Prognosis contributed by invitation will be resumed early in June, when publication of the concluding lectures on the Preventive Aspects of Medicine at King's College has been completed.

SUSSEX PROVIDENT SCHEME.—The sum of £11,449 has been paid through this scheme to hospitals and coöperating bodies for services rendered to subscribers during the half-year ended on March 31st. The Royal Sussex County Hospital received £3833; the Royal Alexandra Hospital for Sick Children, £1361; and the New Sussex Hospital for Women and Children, £1161. The two Sussex county councils, two corporations, four education authorities, and four nursing associations, were also included in the allocation.

THE PREVENTIVE ASPECTS OF MEDICINE

A Series of Lectures in progress at King's College Hospital Medical School

XXII.—THE PREVENTION OF ACCIDENTS

THE constellation of causes producing those unexpected events called accidents is made up of two factors, material and personal, which vary greatly in their relative importance. At one extreme is an accident arising from a novel and therefore unforeseen defect in material; at the other is a mishap brought about by the eccentric behaviour of an individual, in circumstances where, except for that eccentricity, no accident could arise. As an example of the latter I was once shown a machine so efficiently guarded that I was challenged to introduce a finger into the working parts, yet was assured that a lad working at the machine had, by some extraordinary gymnastics, managed to get his hand seriously injured.

The material factors responsible for accidents have been officially recognised since the Factory Act of 1844, which was the starting point of statutory provisions for those mechanical protections of the worker which have now become so extensive that they form a subject of study by themselves. In addition there are numberless customs established by experience, such as, in our own little world, the counting of swabs at the close of an operation or holding a bottle by the neck when putting in the cork, the violation of which carries a risk. As a recent development, the "Safety First" Association seeks to inculcate, on a voluntary basis, the importance of behaviour in accident production.

The systematic study of accidents in their incidence and personal "causes" was begun towards the end of the late war under the direction of what is now the Industrial Health Research Board. This work was not concerned so much with mechanical safeguards—that aspect of the subject offered little new—as with the effect of occupational conditions upon the worker. Further, the important fact that a minority of workers are responsible for more than their proper share of accidents, if not actually a discovery of the Board's investigators, was first established by them upon a statistical basis. The phrase "accident proneness," now in world-wide use, was originally coined by Mr. Eric Farmer, whose investigations I shall describe later.

Occupational conditions affecting accident incidence were studied in 1917–18 by Osborne and Vernon. In their report they quote American figures showing a notable increase of accidents with increase of output, so disproportionate that a 5 per cent. increase in output caused a 20 per cent. increase in accidents; an excessive turnover in personnel, with an excessive number of inexperienced men as a consequence, threw doubt upon the validity of the figures which, at first sight, indicated a close relation between fatigue and accidents. It was shown, however, in our munition factories, that accident incidence in women bore a definite relation to the extent of working hours, and at the time this was ascribed to the influence of fatigue. Since then we have come to be cautious in the use of the conception of fatigue; fatigue in industry is not the simple phenomenon seen in a nerve-muscle preparation, but factors such as boredom, incentive to work, and opportunities for divided attention play a part in manifestations for which the easy diagnosis of fatigue is misleading.

We can, however, accept without further discussion that accidents are influenced by hours of work, speed of output, temperature, lighting, inexperience, and youth of the worker. These conditions affect the behaviour of the worker; their results may be specific to the individual but their existence is general.

A new approach to the problem was opened up by Greenwood and Woods, who published in 1919 an important statistical examination of the individual distribution of accidents.

The fact is easily established that when people are engaged upon a specific task and exposed to risk of accidents, especially so trivial as to allow the victim to continue at work, it is observed that some have no accidents, some have one, some two, and some more than two.

If these accidents were accidents in the strict sense: if each stood alone and the occurrence of one accident to an individual had no relation to his likelihood of having another, then the distribution described above would conform to the type of a pure chance distribution.

If, however, the occurrence of one accident altered the chance of the victim incurring another, just as one attack of a disease may lead to immunity or to increased sensitivity, the type of chance distribution would not fit. The distribution would be biased.

A third possibility is that the workers differed from the beginning, that some of them were more liable to suffer mishaps than the rest of the group. Then the distribution would depend upon unequal liabilities.

It was readily shown that those people who had an accident in one period had more accidents in a second period than any chance distribution would give; those who were immune to accidents in the first period tended to be immune in the second. That is, the incidence of *first* accidents was not a chance distribution. Varying individual susceptibility to accidents is therefore an extremely important factor in determining the distribution. Further statistical work by Miss Newbold in 1926 confirmed this finding, the consistence of individual tendency to accident being shown by the association found between (1) accidents in two different periods, (2) accidents of one type and accidents of other types, and (3) accidents in the factory and accidents at home.

Accident Proneness

Up to this point the only means of recognising liability to accident is the occurrence of repeated accidents, but Farmer and Chambers now set out to discover some method of examination that might reveal it by other means. In this they have succeeded, and "accident proneness" as used by them indicates the possession of those qualities which have been found by independent research to lead to an undue number of accidents.

In their investigations they used a battery of psychological tests and found that a group made up of the dotting test, reaction-time test, and pursuit-meter test (called æstheto-kinetic tests) yielded significant correlation coefficients between the scores and the accident rates. Ocular muscle-balance tests gave an interesting result. Hyperphoria was definitely related to an increased accident rate, whilst the percentage difference in accident rate between those with and those without eso- or exophoria was inconsistent; in one large group persons with these defects actually had a lower accident rate than those free from them. Intelligence tests produced results that had no relation to accident incidence, but tremor, though occurring in only a few cases, was, as might be expected, correlated therewith.

This brief account gives a poor impression of the complicated work involved, and omits many points of interest. Heterophoria, for example, was correlated with accidents; so were the æstheto-kinetic tests;

but heterophoria and these tests did not correlate between themselves. That is to say, they probably were measures of different qualities unrelated in themselves yet both concerned in the production of accidents. An important by-product of the investigation was the discovery that the æstheto-kinetic tests and the intelligence tests correlated positively with industrial proficiency, though they did not correlate with each other. Also none of the tests correlated with sickness incidence, although that correlated with accidents and industrial proficiency.

Detection of Psycho-Neurotic Symptoms

These tests are all objective and presumably independent of any personal bias of the observer. But the æstheto-kinetic group depend upon the behaviour of the subject; so do accidents, and we can express the results by saying that people who behave in a particular way at the tests will tend to behave at work in such a way as to produce accidents. This consideration provides a convenient link with a method of investigation which leads by another road to possibly similar results. Beginning with a research into telegraphists' cramp—which, according to modern views, is not to be regarded as a disorder of muscle or nerve but of behaviour, like a stammer—I have been led on to systematise a method of interviewing designed to elicit the presence of psychoneurotic symptoms among presumably healthy people. Everyone dealing with "nervous" patients develops his own method of eliciting what he regards as diagnostic information; questionnaires for the same end are to be found in the literature and they apparently find favour in the United States. As guides to a beginner in interviewing such questionnaires are useful, but when handed to the subject for written answers they seem to me quite inadequate. I recollect being given, when a student, a book of instruction in case-taking which was practically a questionnaire for my guidance; to hand the book to the patient and invite his answers did not enter my mind or that of my teachers. A knowledge of disease and symptomatology was necessary in order to follow up the clues given by the patient, and in the same way an interviewer seeking for "nervous" symptoms or temperamental qualities must know what to look for and how to look for it.

I have now used and taught the method of personal interview sufficiently to be sure that the results are consistent and reliable, whether the work is done by myself or a trained assistant. As a check upon my findings, however, I used the McDougall-Schuster dotting machine, which was also included by Farmer and Chambers in their tests. I classified my interview results numerically, and statistical methods showed that a high incidence of nervous difficulties correlated with a poor dotting record.[1]

About 20 per cent. of the working population studied by me suffered from nervous symptoms which, in my judgment, interfered with happiness and efficiency; they also did, on the whole, a bad dotting test. Farmer and Chambers found that about 20 per cent. of their working population had a high accident incidence and did, on the whole, a bad dotting test. It is not practicable to stage another investigation to test the identity of their 20 per cent. and mine, but if we assume their identity—or a high correlation between them—then we have gone a step farther and may hope sometimes to find an answer to the question why a particular individual is prone to accidents. Farmer and Chambers point out that "the correlation coefficients between the tests and accident rates were for the most part small, this suggesting that accident proneness is dependent upon many dominant factors and not on a single predominant one, and affording no evidence that the tests measure the most important of these. This can only be determined by further experiment." The practical value of the tests is suggested by the fact that in the æstheto-kinetic group the accident rate of the worst 25 per cent. was about two and a half times as great as that of the remaining 75 per cent. Their applicability in eliminating the accident-prone is obvious, and would, I think, be increased by the addition of the personal interview.

It is to be noted that the tests themselves bore no relation to the occupation of the subjects, who were apprentices in the workshops of Naval and Royal Air Force establishments. Any large group of workers whose conditions were sufficiently uniform to provide statistically reliable material would have served equally well.

The investigators refrained, in the case of æstheto-kinetic tests, from making any claims as to what qualities they were testing. The McDougall-Schuster dotting machine was designed as a test of sustained voluntary attention but is cross-cut by other factors. In the hands of McDougall and May Smith it proved useful as an indicator of the results of loss of sleep or the administration of certain drugs, but only when the normal test-result of the subject was established. May Smith and myself found that its results correlated with the presence and degree of psychoneurotic symptoms. But *what* it measures we do not venture to say; nor do Farmer and Chambers.

Tests for Motor Drivers

Quite a different principle is claimed for tests now coming into use for the purpose of eliminating unsuitable men from those proposed for training as motor drivers. The National Institute of Industrial Psychology has devised a series of tests for the purpose of directly measuring certain qualities regarded as essential to safe and efficient motor driving. Reaction time, resistance to distraction, vigilance, judgment of speed, judgment of spatial relationships, confidence, road behaviour, vision, these and other qualities are given separate markings, the final judgment resting upon the whole profile. This method works, and those who rank badly upon the tests are shown by their records to be liable to an excess of accidents. Yet while some of the tests certainly measure a definite quality—reaction time and vision, for example—it is possible that some are not so specific and, correlating in their results with accident proneness, approach to the æstheto-kinetic tests in measuring an unknown something.

Good results are claimed for work along similar lines in Paris and some American cities. In the latter, however, another mode of attack is introduced. The accident-prone driver is interviewed, and W. V. Bingham has described the extraordinarily mixed bag of results that were obtained. A single bad habit in driving, susceptibility to a small dose of alcohol, wilful road-hogging, loss of sleep, family worries,

[1] Since the possibility arises of finding clinical value in this test as a diagnostic weapon, it must be pointed out that a statistical correlation between factors does not imply that one of them can be used in an individual case to infer the presence of the other. Subjects with hysterical or anxiety symptoms tend to do a bad dotting; so do the accident-prone; but not every subject belonging to one of those groups makes a bad score, nor does every subject with a bad score belong to one of those groups. Only one kind of dotting is found almost invariably to indicate a particular temperament; an exceptionally good score accompanies that obsessional make-up commonly described as "nervy" or "highly-strung," and this even in cases where disabling symptoms are present, so long as they are not associated with pathological anxiety. On a few occasions a very good record has put me on the track of obsessional symptoms that I might otherwise have missed, but that is the only claim I make for any clinical value in the tests beyond a confirmation of opinions already formed.

reckless operation calling for discipline, lack of correct instruction, were found as causes, whilst a few drivers seem to have been born into the accident-prone class. For the tramways and buses of Paris it is claimed that psycho-physiological selection before training has reduced the percentage of unsuitable trainees from 20 to 3·4. (Note here the appearance again of that 20 per cent. discovered by Farmer and Chambers and by myself.)

Some Individual Examples

Leaving these general considerations let us glance at isolated examples that may reveal specific factors.

A building operation necessitated the engagement of a large staff of labourers, and among them were many skilled workers—engineers, for example—who through economic conditions were compelled to accept this low-grade task. The medical man in charge noted an excess of accidents in this group and, in discussing it with me, ascribed it to the fact that the job was temporary but that disablement, with its accompanying compensation, might be more lasting. Please accept my assurance that my colleague, who was not ignorant of psycho-pathology, did not ascribe this to a witting attempt at fraud, but believed that the total of conditions could so affect the men that unconscious motivation came into play. Cases to be described later give, I think, proved examples of unconscious motivation.

Another case is cited by an American writer where dismissals on a large scale took place, falling by preference upon recently engaged workers. The elimination of inexperienced men was expected to reduce accidents, but the number showed a considerable increase. The explanation offered was that the remaining workers were in such dread of dismissal that the worry affected their work and led to accidents.

In both these cases I would point out that the explanations, though plausible, were quite speculative and could perhaps have been tested by the method of the interview.

Therapeutic methods that involve detailed histories or the application of psycho-analytical principles may lead to the elucidation of accidents that happened in the past. One war sufferer wrote for me his auto-biography, which involved a hard childhood and the growth of pathological fears. I will give in his own words the description of an accident brought about by these fears :—

Now I have managed to learn to work the signal box, and I get shifted to a signal box at ..... ; my first night on is a Friday night, and the box must be washed out ; the man I am relieving stays a little while whilst I take off a few trains, then he leaves me. Whenever he goes there is a fear attached to me, yet why it should be so I can't tell, so I starts to wash the floor to help take away this fear ; whilst doing so there is a goods train taking on full wagons and leaving empties ; I have two trains belled on to me. I take them on, I go on with the floor washing, then I hears three whistles as if for me to close the points, the next thing I hear is a crash and I see the guard running down to the box. He tells me I have fouled both main lines, and there I am, with two passenger trains taken on. I run to the phone and tells both boxes to stop both trains, lines are fouled, after that I am useless, fit for nothing, another man is put in the box and the stationmaster takes me to his house and trys to soothe me down. I am courtmartialled over this and has to appear before all the directors, but I was favoured to have sitting on the court, district superintendent . . . . who came only six miles from my native home. I mind the last question I was asked, have I ever been seriously hurt about the head any time. I told him about my brother letting me fall 40 feet and had been carried home as dead. I don't remember any of this incident of my life. However, I was reduced to a carriage cleaner only, for things might have been worse for me.

Since we can hope to prevent accidents only by understanding their causes we may note the inadequacy of cross-examining a man as at a court-martial. I suggest that we are missing important elements in causation by not systematically making a psychological examination of men whose unexpected reactions have brought about an accident. I think they would be in a frame of mind ready to give every help to a trained interviewer, though assurances might be necessary that confidence would be respected.

A shell-shocked soldier gave a history of having been knocked down, years before, by a wagon on a dark road and receiving a fracture of the skull. Bony deformity in the occipital region marked the site of an old compound fracture ; he claimed to remember nothing of the accident or of the preceding 24 hours, and the case seemed quite ordinary. Like many shell-shock subjects, he passed readily into a hypnoidal state in which he recapitulated suppressed episodes, and I took advantage of this to attempt the recall of the accident, in which I succeeded. He had been wandering about the country out of work, depressed, and hopeless ; leaving a village where he had failed to get assistance, he met a wagon as he turned a corner and fell under the wheel. He was not knocked down at all.

Another war patient described how he once found his bicycle getting out of control down-hill ; instead of trying to control it he became agitated by the impulse to pedal harder and force an accident. In this he succeeded and did himself some injury ; later, in the course of treatment, he recalled being initiated into masturbation whilst held on a bicycle ; he at once linked this up with the accident, relating that both to self-punishment and the masturbatory impulse.

A gentlewoman under analytical treatment told of an impulse to pick up a poker just withdrawn from the fire but no longer red hot ; she did it, and the resulting burns were treated sympathetically as acquired in ignorance of the state of the poker. She worked out the unconscious motivations of the impulse, which turned out to be very complicated.

Obsessional Impulses and Road Accidents

Cases are frequent in which an unconscious motivation seems obvious, but only when the patient reveals it can the evidence be convincing. Jung once wrote, concerning the unconscious :—

"One of the most frequent forms of danger is the instigation to accidents. Accidents of every sort, in greater number than the public would ever guess, are of psychological origin. Ranging from insignificant mishaps like stumbling, bumping oneself, burning the fingers, &c., to automobile accidents and catastrophes in the mountains, instances may be found of psychological causation, the accident being sometimes prepared weeks or even months ahead."

Psychoneurotic inhibitions or impulses easily predispose to accidents, especially in motor driving. I know a colleague who has an impulse to charge at an oncoming vehicle, and takes it so seriously that he has given up driving. The driver of a commercial vehicle whom I saw at a clinic admitted the same symptom, sometimes so strong that at the sight of a doctor's plate he felt that he would stop driving and rush in with an appeal for help ; I trust that he followed my advice to seek another occupation, for one's ethical position in such a situation is difficult. Fears of something on the right or the left, or coming from behind, are common symptoms that can influence driving though they are not specific to it. I had a patient who, among a wealth of symptoms, owned to one that made it impossible to drive behind another car where he could not see the road ahead of it ; he was impelled to draw out and try to pass.

All this discussion has an obvious bearing upon that road slaughter which has become so terrifying. Lord Ponsonby, speaking on the wireless recently, said that as a pedestrian he resented having to throw himself into the ditch by a country road when a

driver came along at 60 or 70 miles an hour. But, like many of us, he failed to ask *why* that driver comes along at such a pace. We may select drivers, we may insist upon proper instruction, may stress good manners on the road, educate pedestrians, teach "safety first" to school-children, but we cannot escape the conclusion that, without high speed, motor-car accidents would be much fewer, even though it may be possible to demonstrate in every accident that something other than speed was its decisive cause. An obsessional impulse to speed is found in some people. One pedal cyclist described this impulse to me, and said: "I know I shall get it in the neck some day; but I can't help it, I *must* rush." He also suffered from telegraphists' and writers' cramp, in the causation of which the impulse to rush played a part.

Used with a strict meaning the word *obsession* indicates an urge to think, feel, or do something that is recognised by the subject as irrational and may be effectively resisted. Used in that sense the word is not applicable to the impulse to speed that exists in many drivers, which is neither recognised as irrational nor effectively resisted. To speak still in the language of psychopathology, it is defended by rationalisations, by pseudo-reasons and justifications which are evolved to account for something that arises from quite different and perhaps unknown motivations.

Often, indeed, it is treated as calling for no justification, and a correspondent in the *Times* of May 7th naïvely provides an example. Under the heading of "Sneezing at the Wheel," he remarks that "the danger resides in the fact that it is virtually impossible to sneeze with the eyes open, and at 60 or 70 miles an hour that split second of blindness suffices to precipitate disaster. My own practice, when I detect the premonitory symptoms, is to slow down instantly. . . . . I am quite sure in my own mind that a sudden sneeze is the true explanation of many otherwise unaccountable motoring accidents."

The public acceptance, twice within seven days, of 60 to 70 miles an hour as a speed calling for no question, gives food for thought to one whose experience of road traffic goes back to the use of the old tall bicycle. How has it come about that we are reconciled to the speed of an express train on our high roads? If one questions people, especially drivers, about the attraction that high speed undoubtedly possesses, the answers indicate that fundamental instinctive tendencies there find satisfaction. Sense of power, aggressiveness, risk, or in more general terms "the thrill of it," are part of the attraction, and whoever has heard an enthusiastic motor-cyclist describe the thrill of travelling at 70 miles per hour may ask whether it is not time that the satisfaction of this particular instinctive urge should be frowned upon not merely because of its material but also of its psychological danger. To provide a reasonable outlet for instinctive tendencies is one thing, to cultivate their excessive development is another. The change from the days of the tall bicycle has come about by the gradual cultivation of a tendency that grows by being fed, and only the general distribution of the instinctive tendency has allowed us to become reconciled to a total of killed and maimed that a few years ago would have appeared as fantastic. Every mechanical improvement, whether in roads or machinery, is brought into the service of increase of speed, and unless we can in some way retrace our steps the casualty totals will increase. If this view is correct, it follows that palliatives that do not take into account the checking of the instinctive tendency may themselves make matters worse. Instruction may be enforced upon all would-be drivers; but the personality of the instructor may be such as to infect the learner. The improvement of roads is already recognised as leading to increased accidents, and the objection of cyclists to carrying rear lights has behind it the not unreasonable belief that another check upon speed—though a dangerous one—will be removed.

CONCLUSION

Preventable accidents constitute a problem of human behaviour, and, where that is concerned, facile explanations and obvious measures of control are apt to disappoint. If I have not simplified the subject it is the fault of the subject and our misfortune; but it is clear that in the recent work here described we are feeling our way to an understanding of the behaviour problems underlying accidents and thereby furthering their prevention.

MILLAIS CULPIN, M.D., F.R.C.S.
Professor of Medical Industrial Psychology, London School of Hygiene and Tropical Medicine; Lecturer on Psychoneuroses, London Hospital.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

THE following appointments are notified: Surg. Lts. M. G. Ross to *Kent* and J. G. V. Smith to *Kent* and to *Suffolk*.

ARMY MEDICAL SERVICES

The undermentioned Lt.-Cols. from R.A.M.C. to be Cols.: Bt. Col. G. G. Tabuteau, G. H. Richard, H. H. A. Emerson, Bt. Col. (temp. Col.) W. P. MacArthur, Bt. Col. W. Benson, R. A. Bryden, A. E. S. Irvine, C. J. Wyatt, Bt. Col. F. D. G. Howell, F. C. Sampson, T. S. Blackwell, C. M. Drew, F. A. McCammon, A. Dawson, R. E. U. Newman, J. B. Grogan, E. M. O'Neill, G. B. Edwards, Bt. Col. J. W. L. Scott, T. C. C. Leslie, and A. C. Amy.

ROYAL ARMY MEDICAL CORPS

The undermentioned Majs. to be Lt.-Cols.: M. White, J. J. D. Roche, A. S. M. Winder, H. R. Edwards, W. B. Rennie, W. Mathieson, G. H. Dive, Bt. Lt.-Col. R. Gale, K. Comyn, F. R. Laing, Bt. Lt.-Col. J. M. Weddell, A. P. O'Connor, H. G. Robertson, H. V. Stanley, P. C. Field, R. M. Davies, J. T. Simson, R. F. Bridges, Bt. Lt.-Col. H. G. Monteith, Bt. Lt.-Col. C. H. Stringer, J. K. Gaunt, J. R. Hill, Bt. Lt.-Col. B. Biggar, C. M. Finny, G. Wilson, E. G. S Cane, W. A. Frost, C. D. K. Seaver, W. Bisset, W. L. E. Fretz, T. C. R. Archer, R. Davidson, J. M. Elliott, F. R. B. Skrimshire, W. L. Webster, E. B Allnutt, S P Sykes, A S. Heale, A. G. Biggam, R. K. Mallam, D. T. M. Large, A. Hood, E. A. Strachan, C. J. Blaikie, D. T. Richardson.

The undermentioned Capts. to be Majs.: F. C. Hilton-Sergeant, W. L. S. Cox, W. B. F. Orr, F. J. O'Meara, (Provl.) T. W. Davidson, K. Fletcher-Barrett, (Provl.) C. R. Christian, (Provl.) R. J. Rosie, and remains secd., J. Huston, (Provl.) E. G. Dalziel, C. W. Greenaway.

The undermentioned Lts. to be Capts.: W. B. F. Brennan, P. J. Richards, C. A. de Candole, W. A. Robinson, N. P. Breden, C. M. Marsden, P. T. L. Day, F. K. Bush, E. S. Tweedy, M. J. Kohane, R. C. Langford, L. T. Furnivall, W. H. Hargreaves, T. M. R. Ahern, R. Johnston, J. C. Barnetson, J. K. Chappell, J. B. Macfarlane, H. J. R. Thorne, B. Blewitt, T. J. Moloney, A. P. Trimble, A. D. Low, J. M. Low, H. C. M. Walton, E. W. Gibbs, J. L. Martin, H. K. G. Nash, H. Clain, T. L. O'C. Ryan, J. P. Douglas, H. N. Walker, J. W. A. McIver, A. D. Bourne, G. W. Crimmin, G. W. Kendrick, R. St. J. Lyburn, R. T. Shipman, S. G. M. Lynch, F. King, J. N. Concannon, C. King.

ROYAL AIR FORCE

The undermentioned are promoted:—

Wing-Comdrs. to be Group Capts.: H. A. Treadgold, D. Ranken, A. S. Glynn and F. N. B. Smartt.

Squadron Leaders to be Wing-Comdrs.: R. A. G. Elliott, J. M. A. Costello, P. H. Young, P. T. Rutherford, T. Montgomery, and H. L. Burton.

Flight Lt. (Hon. Squadron Leader) W. S. Stalker relinquishes his temporary commission on completion of service.

SPECIAL ARTICLES

MORTALITY OF BRITISH MERCHANT SEAMEN

BY FLEET-SURGEON W. E. HOME, O.B.E.

WHAT is the death-rate of British merchant seamen, and is it higher or lower than that of the average worker in British industry? Important questions for answering which there is no accurate information available, yet a discussion of knowledge now obtained from the figures for 1929–30 may do something to advance the study of the hygiene of seamen and to lessen their deaths in future.

In the first place, what is the general death-rate of British industry? The basic figures for England and Wales are got from the Registrar-General's Decennial Supplement to his report on the Census, the latest being "Part II., Occupational Mortality, 1921," issued in 1927 in relation to the Census of 1921, the basic table being that on p. 2, dealing with "All Occupied and Retired Civilian Males," ages 16 and over. Here are assembled all the 509,204 deaths that had been registered from this group during the three years 1921–23, and these, correlated with 35,358,036—three times the numbers in the group as enumerated at the Census—yield a death-rate of 14·32, the average age of the group being about 38.

For some years before this report appeared, in fact since 1924, the Royal Sanitary Institute had been explaining to the Board of Trade that it was important to obtain a death-rate for the employed seamen in the merchant service analogous to the death-rates published annually for the Army and Navy. Labour members of Parliament had been pressing this point of view, and the Board of Trade set up a committee to consider the matter. The committee reported in 1926 that a death-rate for only the employed men of the merchant service (of whom alone the Board has cognisance) would be of no value for comparison with death-rates propounded for other industries, as in these other trades the deaths of men occupied and retired are always considered together. The numbers indeed of British merchant seamen employed on ships were roughly known to the Board as were also their deaths, but as regards men who had left the sea, their deaths were reported, not to the Board, but to local registrars; nor was their total number known. The committee asked the Registrar-General to do what he could in his then forthcoming report to elucidate this problem. Accordingly in 1927 he produced, on p. 128 of his report alluded to above, a statement of all the British seamen, ages 20 to 64, that had come to his notice through examining the 1921 Census reports for the United Kingdom as well as the Board of Trade's Census of Seamen for the same year; they were in all 199,306, their average age being about 33. With these figures he printed a summary of their deaths at sea reported to the Board of Trade in 1921–23, and of their deaths ashore (unemployed and retired) extracted from the returns of local registrars. He found in all 7924 deaths, corresponding to a death-rate of 13·27, a statistic incomplete indeed, but far more nearly complete than anything we had had before.

To get a comparable figure from industry ashore it was necessary to extract from the basic table the number of deaths and of persons noted between ages 20 and 65; the deaths were 266,384, the years of life, 29,114,580, yielding a death-rate of 9·15, the average age being again about 38. Within their industry seamen are much younger than men in other industries, and as the young have a lower death-rate, if seamen had died according to the rates for men of their ages in the basic table, their standard death-rate would have been 7·17; so their actual rate, 13·27, was nearly double the standard. Seafaring thus seems an unhealthy occupation. In fact, the Registrar-General, without even making allowance for their younger ages, thought their mortality 75 per cent. worse than the average (see Diagram 1). Thus we have these death-rates for men between 20 and 65:—

	Average age.	Death-rate.
All occupied and retired civilian males ..	38	9·15
All seamen, standard rate	33	7·17
All seamen, actual figures	33	13·27

It was shortly recognised that the figures of the Registrar-General were out of touch with reality, for on one side the class of British merchant seamen was too little defined, and on the other not all deaths reported were relevant, nor nor were all the relevant deaths brought to account. So in 1929 the Board of Trade initiated another examination of the records of seamen and their deaths in the 12 months from Oct. 1st, 1929, to Sept. 30th, 1930, in the course whereof the reports and certificates of deaths, whether sent to the Board of Trade or to the local registrars, were carefully scrutinised, and several were excluded from computation as not applying to men who had served in the British mercantile marine. Ultimately it was decided that there had been in the particular year under scrutiny among the 127,518 seamen actively employed on ships and enumerated in the 1930 Census of Seamen, 642 deaths, and in addition, among seamen unemployed or retired, 2524 deaths ashore in the United Kingdom. The total number of these seamen unemployed or retired was really unknown at that time, but there will be an estimate in the final report of the Registrar-General on the Census of 1931. Yet the number even then will be uncertain, partly because seamen when retired take up other employments to which they now assign

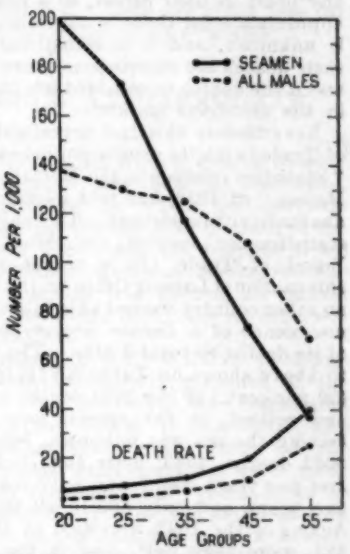

FIG. 1.—The two upper curves show the age-distribution per 1000 of seamen aged 20–64 years and the age-distribution of all occupied males of the same ages in England and Wales. The two lower curves show the death-rates per 1000 of seamen and occupied males. (The chart is based on figures published in the Registrar-General's Decennial Supplement, England and Wales, 1921; Part II., Occupational Mortality, 1927).

themselves in the Census, and partly because seamen, during the years they are going to sea, are constantly flitting between the employed and the unemployed (or retired) categories and back again, far oftener than other workmen, whose passage from employment to retirement is usually definitive, and rarely reversible; seamen, on the other hand, are always becoming unemployed at the end of cruises, though they would be surprised, perhaps indignant, if they were then supposed to be retired. See what may happen at home: a seamen leaves a ship on a Tuesday, that night he is unemployed and so remains till Friday, when he "signs on" on another ship. Suppose that that Friday evening he is run over by a car, and (*a*) is taken to hospital, where he dies that night. His death is now reported to the Board of Trade as that of a seaman on articles. Next suppose he was (*b*) not at once killed; his place on his ship must be filled, so he is discharged and replaced, and when he dies in a week, his death is now reported, not to the Board of Trade, but to the local registrar as that of a retired seaman; this is what would have happened (*c*) if his accident had happened on the Thursday when he really was unemployed. There is no list or enumeration of retired or unemployed seamen at any point in their career, so a death-rate other than approximate for them is unattainable; their number is unknown, and it is something of an accident if their deaths are recorded as those of British seamen, and if the deaths so recorded are truly those of seamen in the merchant marine.

Nevertheless this last investigation by the Board of Trade, with its results published in the Blue Book, "Statistics relating to the Mortality in the Mercantile Marine" of 1932, has told us much that is new and qualitatively important. The only attempt at vital statistics for seamen are those published by the Board of Trade. In a recent publication of the International Labour Office on the diseases of seamen, no other country seemed able to give any figures about prevalence of a disease nearer than the proportion of its deaths to total deaths. The Blue Book referred to above shows on Table XVII. (p. 51) that for 502 (20 per cent.) of the 2524 deaths ashore, unemployed and retired, in the special year, their time since leaving the sea was unknown, but that of the other 2022 deaths, 1043, more than half, occurred in the first five years after leaving the sea, 294 in the second five years, and only 685 in all the years thereafter. Again, of the 1043 who died in the first five years, 625, more than half, died in the first year, 155 in the second, 98 in the third, 86 in the fourth, and 79 in the fifth. And again, of the 625 who died in the year after leaving the sea, 298, nearly a half, died in the first three months, 151 in the second, 90 in the third, and 75 in the fourth three months after leaving the sea. So deaths are far more numerous just after the men leave the sea, and decrease steadily per unit of time for the next ten years. This seems to suggest that many men become unemployed or retired because they are ill, in fact dying; the merchant service, unlike the Navy, recognises no invaliding, the men must arrange that for themselves.

Nothing is said in this Blue Book about the diseases which cause such early mortality among the retired seamen, for the inquiry, like others at that time, was hampered by the need for economy. But that we should know what these diseases were was obviously a matter of great importance, and the President of the Board of Trade, approached by Sir Francis Fremantle, M.P., a former president of the epidemiological section of the Royal Society of Medicine, of which I have been a member since 1887, kindly allowed me to examine the certificates of the "deaths ashore in the United Kingdom" that had occurred during the special year, and within 12 months of leaving the sea. Some interesting figures emerged, published in THE LANCET (August 19th, 1933, with a preliminary note on p. 371). Here one need only say that while in 1929–30—and we may reasonably suppose, somewhat similarly in other years—there occurred 642 deaths among the 127,518 employed seamen, there came to notice nearly as many, 622, among what one would expect to be a much smaller population, the unemployed and just (within 12 months) retired. Among the employed

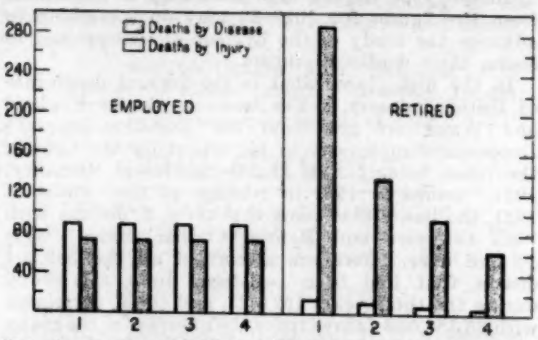

FIG. 3.—Deaths of British merchant seamen by disease and accident, during employment and after retirement. The number of deaths aboard ship (288 by disease and 354 by violence) during one year has been divided into four quarters so as to be comparable with the number of deaths in the first, second, third, and fourth 3 months after retirement, during the same year.

the deaths by disease were 288, but there were 556, nearly twice as many, among the unemployed and just retired. Again, and more striking still, if we take 288 as the number of deaths by disease of the year among the employed, it is not extravagant to suppose these deaths equally distributed throughout the year, that is 72 per quarter; but we are then astonished to find that the deaths by disease in the first three months after leaving the sea were 267, nearly as many as in a whole year among the employed, four times as many as in three months among the employed, whose ranks they have just left, without having had time yet, one would think, to have picked up new illnesses (Diagram 2).

The figures about deaths from pneumonia and tubercle (all) were arresting. Of the 127,518 employed seamen there died during the year 31 of pneumonia and 24 of tubercle; as we may say, per quarter, 8 of pneumonia and 6 of tubercle, but of the "unemployed or just retired" there died of pneumonia, in consecutive periods of three months after leaving the sea, 44, 12, 4, and 3, in all 63, and of tubercle (all) 29, 30, 34, 17, in all 110. If deaths occur like that in other than the special year (and why should they not?), there will fall to be added to the deaths in the Annual Return of deaths of employed seamen, from pneumonia twice as many, and from tubercle, four times as many, before we are in a position to realise how many deaths from these diseases should really be ascribed yearly to service in merchant ships, or what amount of preventable disease there is to combat in the mercantile marine.

Dr. J. Howard-Jones and others who, like myself, have long been urging the need for better sanitation on board and more cubic space for the men in the crew spaces of merchant ships, have been constantly met with the argument that the relatively few deaths

from pneumonia and phthisis recorded in the annual Return of Deaths, issued by the Board of Trade, rather tended to contradict us, and to show we were exaggerating the defects of ships; but if there is at least twice as much pneumonia among British merchant seamen, and four or five times as many deaths from tubercle as, before this Blue Book came out, we believed, it may well be we were right all the time.

Another thing: is it right for shipowners to unload yearly 100 cases of tubercle on to the general public to be cared for till they die, when many of them must, without any reasonable shadow of doubt, have become infected at sea? Should they not be a charge on the industry, as are miners suffering from silicosis, under the Act of 1918?

How many similar deaths of men just retired, and dying as civilians, should be charged to the Army, Navy, or R.A.F.?

Tubercle (all), 1930

—	Total	Cases	Per 1000	Deaths	Invalids	Deaths of invalids within a year
Army ..	178,384	248	1·4	31	200	Not known
Navy ..	88,840	215	2·4	15	210	,,
R.A.F. ..	32,000	27	0·9	3	27	,,
Merchant service	127,518	—	—	24	—	110

The figures in this paper lead to no death-rate, so are obviously incomplete. Of the 2524 deaths of retired seamen in the special year, 294, or 11 per cent. of them, were due to tubercle. Among the 622 deaths, already discussed, occurring within a year of leaving the sea, 110, or 17 per cent., were due to tubercle, the chief cause for this group. The toll which tubercle takes of seamen is serious. What a pity the Board of Trade had not had a D.P.H. or medical statistician on the staff in 1900 to get out facts like those in the recent Blue Book when the Merchant Shipping Act of 1906 was on the stocks. Then, in addition to good orders about foods and cooks, we might have had others about sufficient cubic space for seamen on ships, as their risks would then have been widely known, and not only, as at that time, to medical officers of health to port sanitary authorities.

The figures here submitted are incomplete, but such as they are it has taken nine years to get so far, and as no more knowledge is expected to be obtainable in the immediate future, they are submitted for the information of future students of that rather neglected chapter of hygiene, the mortality of British merchant seamen.

POSTSCRIPT

A rough approximation to the true death-rate of employed British merchant seamen can be got for any year in which the Census of Seamen is held, though this only gives their number on one day out of the 365; for their deaths are recorded pretty accurately every year by the Board of Trade. But deaths of seamen retired, and their numbers, are nowhere stated; and a death-rate for seamen "occupied and retired" is therefore unobtainable.

Death-rates per 1000 for the Merchant Service (occupied)

Census date	1901	1911	1921	1930	1931
Total force	120,412	136,580	96,072	127,518	108,882
Death-rates from—					
Disease	5·8	4·7	4·3	3·1	3·1
Violence	8·0	10·9	4·6	2·4	2·3
All causes	13·8	15·6	8·9	5·5	5·4

The death-rate from violence in sailing ships in 1901 and 1911 was 14·3; it is not known in other years. In 1911 673 seamen were lost in the *Titanic*. In 1929–30 deaths by disease for the first time exceeded deaths from violence. Deaths by alcohol are here included with deaths from disease.

Service Death-rates in 1931

—	Merchant service.	R.A.F.	R.N.	Army.
Total force	108,882	32,448	87,075	178,384
Death-rates from—				
Disease	3·1	1·51	1·3	1·76
Violence	2·3	2·9	0·9	1·01
All causes	5·4	4·41	2·2	2·77

The only death-rates with which those of merchant seamen are at all comparable are those of the men on the active lists of the fighting services, and it must be remembered that all these have quite differing age-distributions. These are given here for 1931, the latest date for which all are available.

A CONFERENCE AT HARROGATE

UNDER the auspices of the British Health Resorts Association a conference was held on Saturday, May 12th, at Harrogate, in which the methods devised at Harrogate for dealing with diseases of the liver and of the skin were made the subjects of set discussion. The Physical Medicine Section of the Royal Society of Medicine was holding its annual general meeting at the same time, and its members coöperated in the debates.

Mr. C. D'Oyly Grange, O.B.E., F.R.C.S., president of the Harrogate Medical Society, presided at the morning session. He welcomed the Association and the section of the R.S.M. to Harrogate, and estimated that before the country went off the gold standard immense sums annually were spent in French spas for treatment that could often be obtained in British resorts. The two topics at this, the first conference of the Association to be held in Harrogate, were important ones, and he called upon Prof. Langdon Brown to open a discussion upon

The Use of Spas in Diseases of the Liver

Prof. LANGDON BROWN, Regius Professor of Physic at Cambridge, said that he would first admit that the rest and change afforded by spa treatment are beneficial when assisted by regulated diet and a scheme of life in a healthy environment, and pointed out that an efficiently organised spa would be able also to afford the benefit to be derived from subsidiary methods of treatment. An impressive body of evidence had been accumulated, he said, as to the metabolic effects of water, and what is true of metabolism in general should be especially true of that great metabolic workshop the liver. He would not try to detail the therapeutic uses that might be made of spas in diseases of the liver, but he reviewed the recent additions to medical knowledge of the functions and diseases of the organ, and asked what practical application of this learning could be made through special methods at the disposal of the spa. Ten

years ago H. Maclean and O. L. V. de Wesselow had improved Straus's lævulose test of hepatic efficiency by examining the effect of the ingestion of lævulose by the blood-sugar curve; the method of direct analysis of samples of bile through the duodenal tube was now coming into use; and van den Bergh's application of Ehrlich's di-azo test for the estimation of bilirubin in the blood was revolutionising our ideas of jaundice. He agreed with A. Hurst's recent statement that these three tests are the only ones that persist as valuable; and through the same period biochemical methods had been simplified and knowledge extended by the discovery of insulin, and of the storage of certain hæmopoietic features in the liver, rendering the rewriting necessary of the stories of carbohydrate metabolism and the pathology of the anæmias. The recent discovery of the influence of choline on the fat metabolism he welcomed as promising. The main work of the liver he summarised as follows:—

"Situated on the path by which all the blood from the digestive organs enters the systemic circulation, it is not surprising to find that the liver helps to prepare all three foodstuffs for utilisation by the tissues. The bile it forms is at once an excretion and a secretion. But further, the liver is an important agent in detoxication and in maintaining the constant composition of the blood"; and he pointed out that the liver has to coöperate closely with the pancreas and the spleen in the regulation of digestion. In the assimilation of proteins he suggested that spa treatment would be of assistance, and he instanced diseases of the liver where there is extreme circulatory disturbance, as in the later stages of cirrhosis. Again, under the less severe conditions of liver accompanying the failing heart, anything which aided the true circulation of the blood through the liver would help to maintain the proper nutrition of the cells and diminish the inflow of toxic material into the circulation. Herein, he pointed out, lay the main advantage of liver packs and the similar methods applied at Harrogate. Coming next to the carbohydrates, where glycogen stores of the liver depend upon the balance between certain endocrines, opinion to-day, he said, is tending to attribute the amenable glycosuria of later life to defective storage. Biochemical advances had shown that the antitoxic power of the liver depends on the good content of glycogen, and patients receiving spa treatment, he urged, should be given the help to be found from insulin and dextrose in toxic states.

After dealing with the antitoxic and anaphylactic properties of the liver, Prof. Langdon Brown agreed with recent workers that the liver acted mainly as the storehouse of a principle formed elsewhere, while preserving the power of adding finishing touches. He discussed the value of liver or liver extract in the treatment of pernicious anæmia, and with regard to the so-called primary anæmias, he said that they could be explained in terms of failure of some stage or other in the maturation of the red corpuscles in the red marrow. But it is, he said, the principle stored in the liver which is essential to the formation of normoblasts from megaloblasts. "The other end of the story," he added, "is that the hæmatoidin supplied by the spleen from disintegrating erythrocytes is converted by the Kupffer cells of the liver into bilirubin, the former giving the indirect and the latter the direct van den Bergh reaction. The iron salts set free in this disintegration appear to be stored up in the liver ready to be used again in the formation of new corpuscles. The well-known excess of inorganic iron in the liver and spleen found in pernicious anæmia is now regarded by L. J. Witts not as evidence of hæmolysis, as was formerly thought, but of the failure of the red marrow to use this iron in the manufacture of new corpuscles. This would postulate some mechanism which normally transports iron from the liver to the red marrow." Prof. Langdon Brown acknowledged that he was rather explaining the activities of the liver in general metabolism, as a guide to further research, than making suggestions for spa treatment more than to stress the need of improving the circulation of the gland in certain liver conditions.

Turning from the internal to the external and excretory functions of the liver, Prof. Langdon Brown pointed out that the gall-bladder allowed a discontinuity in discharge of a fluid being continuously formed, while the bile, when in the bladder, lost water and received cholesterol and mucin, thus becoming concentrated and viscous until obstruction might occur. More and more, he said, he was convinced of the importance of preventing the accumulation of viscid bile in the gall-bladder, while he subscribed to the view that infection arrived at the gall-bladder as much through surrounding lymphatic channels as by ascent of the common bile-duct. He concluded by referring to the great opportunities offered at Harrogate for research in these matters into individual human reactions.

Dr. J. W. McNEE spoke from the standpoint of a practical physician of the use that might be made of spas in the treatment of acute and chronic liver diseases. He testified to the value of spa treatment in most chronic conditions, mentioning as amenable hepatitis generally but not including malignant conditions. Injury of the liver, acute and chronic, he pointed out might range between any febrile or inflammatory condition, from which recovery might be expected, and the total breakdown of acute necrosis. He laid stress on the recuperative power of the liver, saying that as much as four-fifths of its great expanse might be destroyed when the remaining one-fifth would discharge the duties and develop cells and ducts to that end, a circumstance which he described as "the doctor's trump card." Treatment of the damage might be successful if the damager could be rendered inactive—e.g., if alcohol were cut off. In catarrhal jaundice, usually classed as affecting the ducts, there was often damage to the cells. Recovery here would be obstinate and the coöperation of the surgeon might be necessary. Alluding to what was once a routine procedure in gall-stones—namely, the administration of olive oil—he pointed out that it was a remedy for the flatulence that often formed a most distressing symptom in cholecystitis. Dr. McNee then spoke of the value of the duodenal tube (blunt-pointed) in diagnosis, and concluded by testifying to the great service to medicine of spa treatment through its special medical experience, its amenities, and discipline.

Dr. CURTIS BAIN read the notes of a series of cases of diseases of the liver, all inflammatory, classified them under their symptoms, and described the common regimen of spa treatment in accordance. Concerning the alcoholic liver he expressed the opinion that alcohol was a poison secondary to cholecystitis and not to be regarded always as the origin. He attributed the good results of spa treatment in liver diseases to the influence, in this order, of (*a*) discipline—which he allowed was hard to evaluate; (*b*) liver-packs when skilfully administered; and (*c*) sulphur water. He then described the results of a series of heroic experiments upon himself with the duodenal tube to ascertain the cholegogic influence of Harrogate water.

Dr. WILFRID EDGECOMBE gave the details of treatment at the spa suitable to the liver patient, and mentioned the complicated constituents of the water obtainable from the various sources as accounting for the metabolic effects which were cholagogic, diuretic, and antiseptic; he pointed to the presence of barium as effective in depression. The liver pack, followed by the needle douche, was employed as a counter-irritant, while the stimulating baths should be followed by proper massage. In cases of congested liver, with concentrated dark urine and possibly glycosuria, such a regimen might act like magic. He outlined illustrative cases suggesting the good that followed spa treatment in early cholecystitis and perhaps in the first stages of gall-stones indicated by biliary sand.

Prof. D. P. D. WILKIE spoke of the great value of a preliminary spa course in cases where operation would usually follow. The fat flabby subject was not fit for operation in comparison with one who under strict regimen for a few weeks had lost perhaps two stone in weight and gained in general health and muscular tone. Such properly prepared patients, trained for the ordeal like athletes for a boat race, sometimes might escape operation, a circumstance which he claimed as "a triumph of conservative surgery." He mentioned that delay in operation, in cases of obdurate gall-stones, subjected the patient to the risk of malignancy, and noted that the biliary surgery of to-day thought in terms of general physiology rather than in those of anatomy.

Dr. MANSON-BAHR spoke of the progress of therapeutics in tropical disease as having removed large classes of disease from the sphere of spa treatment, and, while he doubted if the once popular term "tropical liver" had ever been an accurate description of an entity, he said that there was ample room for further research into the relations between climate and disease. Undoubtedly the recovery-rate in England was much higher than on the spot in many cases of illness sustained abroad.

Dr. M. B. RAY, president of the Physical Medicine Section, R.S.M., presided at the afternoon session, when a discussion was opened on the

Spa Treatment of Skin Diseases

by Dr. S. ERNEST DORE, who commenced by pointing out decisively that it is to resident practitioners in Harrogate that guidance must be looked for as to which varieties of sulphur or saline waters are best suited to particular ailments. He found the trend of present opinion to be in favour of the exogenous causation of skin diseases, a view borne out by the comparative failure of dietetic measures, of internal drug treatment, and of attempts to remove septic material. He claimed eczema as an example, and pointed to the varying virtues attributed to sulphur, as found in the Harrogate waters. He pleaded the impossibility of mentioning all spa methods as directed to different cutaneous disorders, deciding to concentrate attention on a group of congenital diseases of the skin such as ichthyosis, known in its milder form as xerodermia, and erythemato-squamous affections of which psoriasis was the type. With regard to ichthyosis he pointed out that the discomfort was great owing to excessive dryness and scaliness of the skin, difficulty of movement according to the amount of thickening and fissuring, and liability to inflammatory dermatitis. These, he said, may last throughout the patient's life, although there is some tendency to amelioration as age advances. In this affection some lubricating and keratolytic preparation must be applied more or less continuously to the whole body, and for this purpose nothing is better than sulphur in ointment and sulphur baths. The ointment, he said, must not be continued too long or it may itself cause dermatitis, but its use can be repeated from time to time until the skin becomes soft and free from scales, and thus made amenable to baths and emollients. Coming to psoriasis, he said that treatment by baths was most often used and most likely to be successful, and unless scales were removed by alkaline or saponaceous baths, ointments are practically useless though alkaline sulphur waters have in themselves remedial effects. For the extensive erythemato-squamous eruptions such as the pityriases and chronic seborrhœic dermatitis he found mild sulphur baths suitable treatment. Other conditions enumerated by Dr. Dore as susceptible of relief or improvement by proper courses of sulphur baths were Hebra's and Besnier's prurigo, parasitic skin affections, acne, and the generalised pruritus of the senile type, a list which he described as not attempting to be complete; and while laying stress on sulphur, he could not forget the benefits to be obtained in many conditions from chalybeate waters, mud packs, and colonic irrigations to be readily obtained by patients at a centre like Harrogate.

Dr. HALDIN DAVIS spoke amusingly of the view of the great Robert Willans who had associated the prevalence of cutaneous disease in England with the absence of bathing. He spoke highly of spa treatment in skin diseases and instanced its beneficial results on psoriasis and conditions associated with nervous disorder like lichen planus.

Dr. F. A. BEARN (Strathpeffer) mentioned, as two diseases particularly benefited by spa treatment, psoriasis and eczema in the gouty subject.

Dr. BERTRAM WATSON pointed to the value in the treatment of diseases of the skin—"that mirror of the mind"—of mental diversion. In reference to exogenous or endogenous causation he declared his belief in a gouty eczema. He spoke of good results at Harrogate from the treatment of seborrhœic eczema, psoriasis of the chronic limited kind, and acne, while in chronic urticaria he had found colonic lavage with sulphur water useful. Dr. Watson was particularly interesting in his differentiation of the springs of various strengths at Harrogate comparing their actions upon different conditions. He gave figures which showed a very high percentage of skin cases as undergoing successful spa treatment at Harrogate.

Dr. C. W. BUCKLEY (Buxton) said that the time had arrived when dermatology should have more scientific reasoning behind it; not sufficient grounds were forthcoming for particular methods of treatment, so that evidence in favour of procedures depended only upon individual report. He favoured the endogenous view in what he would term gouty eczema.

Dr. EDGECOMBE spoke of the nervous connexions of skin disease as shown in lichen planus and senile pruritus. Referring to the prescription of regulated diets, he said that the keynote was moderation, and that at Harrogate special diets when ordered would always be obtainable.

Dr. GEOFFREY HOLMES indicated that where the spa was resorted to for a particular disease a common regimen for diet at the spa could be to a great extent laid down. This did not meet the case at Harrogate, but at all the Harrogate hotels special diets could be obtained in accordance with medical orders for special cases.

Dr. ALFRED COX said that he had heard many criticisms from not unfriendly people, who had visited both British and foreign spas, to the effect

that at home there was not effective combination between the municipality, the hotel, and the doctor, for ensuring that the "cures" should be regarded as an organic whole, in which the credit of all parties was concerned.

On Saturday evening a dinner was given at the Hotel Majestic by the Harrogate Medical Society to the delegates and visitors, Mr. D'OYLY GRANGE presiding. DR. BERTRAM WATSON proposed prosperity to the British Health Resorts Association, to which Lord MESTON, president of the Association, replied. Lieut.-Colonel BYAM then proposed the toast of Harrogate, to which the Mayor, Councillor J. H. NEWSOME, and Mr. D'OYLY GRANGE replied. The evening closed with a cabaret show and a dance.

The Conference was a great success, the scientific debates being of a practical nature and the social functions, generously organised, being aided by fine weather.

PANEL AND CONTRACT PRACTICE

Insurance of School Leavers

A FEW months ago the Birmingham insurance committee passed a resolution "that the National Health Insurance Act should be amended so as to bring within its scope all persons who on leaving school enter into insurable employment between the ages of 14 and 16 years," and sent it to every other insurance committee with a request that it might be discussed and adopted. Several committees have discussed the matter; some have agreed with the proposal; others think it is not the time to extend the scope of the Act when sickness claims are so heavy that funds are badly depleted. The fact that no report of discussion on this subject has been received from panel committees or the Insurance Acts Committee may be due to the feeling that doctors ought not to be consulted on such matters; they should just be prepared to treat anyone sent to them under the Act. There are two main reasons why this resolution is popular. The first is that as children are medically inspected and tabulated in the schools up to the time of leaving there is at present a gap in their medical history cards until they arrive at 16 when they become insured under the present Act. The resolution would fill in the gap in those cases where work was obtained on leaving school. The other reason is that it would help to put a stop to the practice of firms who employ children on leaving school and dismiss them at the age of 16 when they become insurable. It may be time for the medical profession to express an opinion on the matter, bearing in mind that the risk would not appear to be large, for most children have had their minor infective diseases whilst at school, and the period from 14 to 16 would not add much to the liability of health insurance.

The Parish Doctor

In a recent issue of *John Bull* a "parish doctor" points out that as his patients have no choice of doctor he has always taken special care to treat them exactly as he would private or panel patients. But these ideals have been wearing thin under the stress of overwork and underpayment. When he started his remuneration was £85 a year or 32*s.* 8*d.* a week for an average of 32·6 services, mostly home visits—almost exactly 1*s.* per service. For this shilling, of which 3*d.* was deducted for income-tax, he had to supply medicines; part of it must be written off for upkeep of surgery and motor expenses, the remainder, if any, was payment for professional services. The rate of payment per insurance service in the same practice was 2*s.* 4*d.*, and this of course did not include drugs. If insurance patients increase in number the payments increase, but the parish doctor's payment remains the same no matter how many patients the relieving officer sends him. They are, moreover, the selected unfit and generally permanently unfit. They are often old people who need a disproportionate amount of visiting. Extra payments under the parish system are few. If sent to a midwifery case by the relieving officer the doctor gets a fee of 10*s.*; if he is called in by the attending midwife the county council pays him two guineas. The council, it should be added, is the paying authority in both cases. For the certification of a person of unsound mind the district medical officer gets a fee of one guinea; if after making a very careful examination he cannot certify the case he gets nothing. It is surely time for the whole system to be overhauled and adequate payment with free choice of doctor substituted.

Arch Supports

These continue to give trouble. It will be remembered (March 10th, p. 544) that a decision of referees given in October, 1933, brought arch supports into the category of splints, and as such to be ordered on the ordinary prescription form and charged to the drug fund. Not many doctors, however, have much experience in ordering the correct arch. It is not sufficient to order Mr. B. a pair of supports without giving details as to the height of the arch; moreover, these supports need frequent adjustment if the support is to do any good. The chemist, as a rule, knows still less about them. He does not stock such things, and when presented with a prescription for a certain size of supports he simply says "I have not any arch supports. You had better go to XYZ who do that sort of work." XYZ are not under contract with the committee and charge the patient for supports. This causes trouble because by this time the patient has heard that he can have these supports "on the panel," so why should he pay for them. It would seem quite obvious that when a patient comes to him with a prescription for arch supports he should send him to some instrument maker of repute with a note asking that firm to deal direct with the patient, but to send the account to the chemist. The chemist would then add his dispensing fee and obtain payment in due course from the insurance committee. When adjustment became necessary the patient would obtain a new prescription and the process would be repeated. But this procedure has not been notified to the chemists. Before the referees came to their decision that arch supports are splints such appliances were often supplied and paid for by approved societies out of additional benefits. The Ministry of Health apparently do not find the position created by this decision at all easy to deal with. It has been suggested that there should be a list of specified splints which can be ordered by prescription on the drug fund, or that there should be a better definition in the regulation of what a splint is, in order to exclude things which a chemist can hardly be expected to supply. A less serious suggestion is that on the analogy of drugs there should be an advisory com-

mittee to draw up lists of things that are (*a*) always splints, (*b*) sometimes splints, (*c*) and never splints.

The National Formulary

The Birmingham panel committee has called attention to the difficulties which arise when doctors write prescriptions for medicines under letters which are included in earlier editions of the National Formulary, but are not included in the present edition. It is proper in such cases for the formula to be written in full. There are, however, undoubtedly cases where the intention is to prescribe present formulas, but an old title is erroneously used. For instance, "Mist. Sodæ cum Rheo" is frequently prescribed, although as far as the formulary is concerned this title has been extinct for many years, and to dispense accurately what is ordered it would be necessary to go back to the 1924 edition. No doubt some prescribers wish the "Mist. Rhei Ammon. cum Soda" or "Mist. Rhei Co." of the present formulary to be dispensed, but to refer to the doctor in all such cases is not practicable. It should not be forgotten that there have been numbers of dispensing establishments opened within the last few years which do not possess copies of the old editions of the formulary. Insurance practitioners elsewhere would be wise in their own interests to make certain that they are using the latest nomenclature when ordering a stock, otherwise their cost of prescribing may show an increase which they did not intend.

PUBLIC HEALTH

Local Authorities and Insulin

THE text of the Finance Bill, issued last week, makes known the Government's intention to place insulin on the free list under the Import Duties Act. Whatever effect, if any, this may have on the price of insulin in this country, the decision is a public recognition of the peculiar importance of insulin as a remedy. In 1925 Parliament passed a short Act enabling Scottish local authorities to arrange for providing medicine and treatment for diabetic patients. A recent political conference at Liverpool urged the Minister of Health to give serious attention to the provision of treatment (either free or on reasonable terms) for such patients in England. He has replied that English local authorities can act for the purpose under Section 133 of the Public Health Act of 1875. Referring as it does to legislation enacted long before the discovery of insulin, the reply deserves fuller explanation. The section gave local authorities a general power (subject to the sanction of the Minister) to provide "a temporary supply of medicine and medical assistance for the poorer inhabitants of their district." The Minister, it is understood, sanctioned under this enactment a free supply of simple medicines for hop-pickers in certain rural districts. Specific exercises of the statutory power will be found in the Diphtheria Antitoxin (Outside London) Order of 1910 and the corresponding order for London of the same date, and also the Public Health (Cerebro-spinal Fever) Regulations of 1918. The latter sanctioned the provision, by the councils of administrative counties and of county boroughs, of serum and vaccine together with the necessary apparatus for their use. As regards antidotes and remedies against infectious disease, many authorities have taken special power by local legislation for their provision and supply to medical practitioners with or without charge; an instance of this familiar clause will be found in Section 65 of the Wimbledon Corporation Act of last year. As regards insulin there is, as the Minister observes, the general power under the 1875 Act, but it does not appear that he has given any general sanction as he did in the case of diphtheria antitoxin or cerebro-spinal fever serum. Section 133, which appeared in an earlier form in the Sanitary Act of 1868, looks a little old-fashioned now. Some limitation seems to be connoted by the words "temporary supply," and the reference to the "poorer inhabitants" introduces an invidious element. The consolidation of public health enactments, now in hand, will give the draftsman a chance to modernise the language in the light of present requirements.

A Radiologist for Hammersmith Hospital

The London County Council has decided to make provision for a radiological department at the Hammersmith Hospital which shall be the consultative centre for the whole of the L.C.C. hospitals service. Cases will be sent to the department from other hospitals for expert opinion on diagnosis or treatment. It is recognised that the officer in charge of this department, associated as it will be with the British Post-graduate Medical School, should be of outstanding ability, and it is proposed to make the appointment early in order that his services may be available on questions relating to the equipment and planning of the department. The proposed salary is £1500 a year, the appointment to take effect, if possible, on July 1st.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED MAY 5TH, 1934

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 2 (last week 9); scarlet fever, 3005; diphtheria, 1077; enteric fever, 23; acute pneumonia (primary or influenzal), 1021; puerperal fever, 57; puerperal pyrexia, 128; cerebro-spinal fever, 32; acute poliomyelitis, 6; encephalitis lethargica, 10; dysentery, 8; ophthalmia neonatorum, 106. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on May 14th–15th was as follows: Small-pox, 9 under treatment, 3 under observation (last week 8 and 0 respectively); scarlet fever, 1598; diphtheria, 1684; measles, 2740 (last week 2857); whooping-cough, 310; puerperal fever, 36 mothers (plus 12 babies); encephalitis lethargica, 259, poliomyelitis, 3; "other diseases," 142. At St. Margaret's Hospital there were 13 babies (plus 6 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox, 3 (0) from enteric fever, 91 (33) from measles, 7 (0) from scarlet fever, 48 (9) from whooping-cough, 34 (10) from diphtheria, 42 (12) from diarrhœa and enteritis under two years, and 68 (14) from influenza. The figures in parentheses are those for London itself.

Measles is still diminishing, but 11 fatal cases were reported from Liverpool, 7 from Newcastle-on-Tyne, 5 from West Ham, and 3 from Newcastle-under-Lyme. Bradford, Sunderland, and Northampton each reported a death from enteric fever. Whooping-cough proved fatal in 8 cases at Liverpool, 6 at Birmingham, 3 at Walsall. No great town recorded more than 2 deaths from diphtheria.

The number of stillbirths notified during the week was 282 (corresponding to a rate of 41 per 1000 total births), including 41 in London.

EDINBURGH ROYAL INFIRMARY.—The Edinburgh dean of guild court has approved plans for a new venereal diseases and dermatological department which is estimated to cost £40,000.

CORRESPONDENCE

SANITY IN A MENTAL WARD

To the Editor of THE LANCET

SIR,—Unavoidable circumstances have prevented me from reading till now the annotation with the above heading in your issue of April 28th (p. 909). May I extract the following passage from it in order to point what I believe to be the obvious moral? A "delirious" patient is consigned to the "mental ward of a public hospital." (Incidentally, is not such a place well-nigh legendary?) Your annotator comments:—

> "Ideally it would be possible to have two wards in a general hospital in each large centre reserved for delirious and confused patients whose mental symptoms followed upon physical disease." This arrangement "might lead to general physicians and psychiatrists working in closer association; some general trained nurses would acquire greater acquaintance with some forms of mental disorder; and the medical students would have occasional opportunities of seeing acute psychoses without being wholly dependent upon journeys to distant hospitals. . . . So far as the student is concerned the divorce of ordinary clinical experience from his acquaintance with acute psychotic and psychoneurotic disorders leaves him unprepared for the exigencies of practice when at any time he may need to deal with them."

The moral is that there should be in every city with a medical school a complete indoor and outdoor psychiatric clinic in association with and a recognised part of the general hospital centre. Large towns, without a school, can follow suit. Here such patients as the above—and many other cases of psychosis—could be dealt with, and the skilled coöperation, teaching, and experience referred to could be provided, and research in its highest forms carried out.

This provision, regarded as elementary, and long since made on the continent, has been urged for this country to my personal knowledge for 40 years—and probably longer. But apart from the Maudsley Hospital (a special case), nothing has been done. I read that Their Majesties are to honour with a visit a new mental hospital. The latest of the kind it may be, nevertheless of a familiar kind; not a fundamentally new conception. This is as far as we have got. The occasion is doubtless auspicious. It would be far more so were it concerned with the inauguration of the psychiatric clinic we have so long been pleading for.

I am, Sir, yours faithfully,

Hove, May 9th. EDWIN GOODALL.

ORAL IMMUNISATION AGAINST TYPHOID

To the Editor of THE LANCET

SIR,—In your issue of April 7th (p. 764) your Paris correspondent gave an account of the annual meeting of the Marseilles Medical Society at which the endemicity of typhoid fever in that city was considered. It was decided at this meeting to recommend preventive vaccination, but exclusively by subcutaneous injection, vaccination by the mouth, according to the Marseilles practitioners, giving uncertain results, an immunity of a few weeks only, and a false sense of security. But in my opinion immunisation by the mouth is to be considered, both in the light of statistics and of experience, as certain as parenteral vaccination, the mechanism of the establishment of immunity being precisely the same in the two cases. The only difference between the results lies in the fact that the oral route seems to establish immunity more rapidly than the hypodermic route. We have seen for instance, during an epidemic of typhoid at the Prytanée Militaire de la Flèche, where the pupils were vaccinated fifty-fifty by the two methods, that among those vaccinated by the mouth the epidemic was stayed much more rapidly than among those immunised by T.A.B.

More than four million persons have been vaccinated against typhoid, cholera, and bacillary dysentery by the mouth, of these some 250,000 under the control of public sanitary authorities. All without exception have declared that the two modes of vaccination had equal value. I do not wish to insist here on the Japanese experience that the oral results are superior to the hypodermic; but comparative vaccinations carried out in India under the control of the Health Commission of the League of Nations, and based on a large number (31,700) of subjects led Dr. Russell to conclude: "The bilivaccine (full dosage) and anti-cholera vaccine (double dose) give much the same degree of protection from attack." Dr. Cluver, who undertook the same vaccinations under the ægis of the Government of South Africa, estimates that the results obtained by oral vaccination are more favourable than those given by injection.

There remains the question of the duration of immunity, said to be "only for a few weeks." This statement seems to me gratuitous. None of the sanitary institutions quoted, nor any government, has reported that oral immunity lasted a shorter time than hypodermic. It is possible that among vaccinated persons there could be found a small minority who cannot be protected, at all events completely; but this minority is found equally among "parenterals." During the war the only method of vaccination was by injection and that did not prevent, among 2334 typhoid cases nursed at Bar-le-duc hospital, the discovery of 469 cases who had been vaccinated by injection one or more times and had contracted typhoid one to eight months after vaccination.

I have only attempted to bring to your knowledge rectifications based entirely on controlled facts, leaving your readers to draw their own conclusions in favour of this or that method of vaccination.

I am, Sir, yours faithfully,

Paris, May 3rd. L. F. DESTOUCHES.

DIAPHRAGMATIC HERNIA

To the Editor of THE LANCET

SIR,—With reference to the case of congenital diaphragmatic hernia reported by Dr. G. H. Greenway in your issue of March 24th (p. 628), and his request for information of other recorded cases, may I draw his attention to the case of G. H. Dodds and J. D. S. Flew (Univ. Coll. Hosp. Mag., 1928, xiii., 43) and to the letter of Dr. Herbert R. Spencer in the subsequent issue (p. 123) where he draws attention to four specimens in the University College Hospital Museum, and to the value of the Obstetrical Transactions, particularly the last (index) volume of 1907 as a record of obstetrical and gynæcological publications from 1860 to 1907. In Dodds and Flew's case, the infant lived eleven days. The hernia was through a persistent pleuro-peritoneal sinus on the left side and was therefore without a hernial sac, and the left side of the thorax contained the stomach, jejunum, ileum, cæcum, ascending colon, transverse colon, spleen, pancreas, and left lung.

I am, Sir, yours faithfully,

STEPHEN K. MONTGOMERY, M.D., D.R.

Johannesburg, April 25th.

BENZENE AND BENZINE

To the Editor of THE LANCET

SIR,—In THE LANCET of May 12th (p. 1025) there appears a report of an inquest on a cellulose sprayer, in which there is reference to "benzine" poisoning. May I point out that this should be "benzene" (benzol)? Benzine, the distillate of petroleum, does not, as far as I am aware, ever produce chronic poisoning. Benzene, a coal-tar distillate, on the other hand, has long been known under certain conditions to produce a form of aplastic anæmia. I draw attention to this because reports of such cases are extracted and repeated, and confusion consequently arises on the relative toxicity of these two bodies.—I am, Sir, yours faithfully,

JOHN C. BRIDGE,
May 15th. H.M. Senior Medical Inspector of Factories.

THYROIDECTOMY FOR HEART FAILURE

To the Editor of THE LANCET

SIR,—In your issue of Feb. 10th appeared a leading article drawing attention to Berlin's work on thyroidectomy for heart failure (Amer. Jour. Surg., 1933, xxi., 173). Perusal of your article and reference to Berlin's work encouraged me to operate on the following case, and the result up to date has astonished me.

On March 9th a woman aged 66 was admitted to the Buchanan Hospital for heart failure and ? ovarian cyst. Her medical history was shortly as follows:

1898.—Rheumatic fever.
1914.—Myomectomy and ventro-fixation of uterus.
1932.—Multiple arthritis. The patient was told her heart was affected.
1933.—Two heart attacks in October, has been in bed on and off ever since.
1934.—Patient noticed a lump on right side of abdomen.

On admission the patient was seriously ill, cyanosed and dyspnœic with œdema of ankles, congestion of pulmonary bases, and enlargement of liver. A diagnosis of congestive heart failure due to mitral stenosis and aortic regurgitation was made.

On April 22nd, the day before operation, the patient's condition was as follows: (1) Cyanosis of lips and venous congestion of neck. (2) Œdema of ankles. (3) Liver 2 in. below costal margin and tender on palpation. (4) Albuminuria. (5) Moist crepitations at both pulmonary bases and dullness at right base. (6) Exercise tolerance test. Resting pulse-rate 90 and irregular. The patient was told to sit up and lie down ten times. She became dyspnœic and the pulse dropped to 84 and became more irregular.

The patient's mental outlook was pitiable. She was thoroughly sick of life, and readily signed a special permit for operation in which it was stated that she might not return from the theatre alive. A complete thyroidectomy under avertin and novocain block (Labat's method) was carried out on April 23rd, Berlin's technique being followed. Two parathyroid bodies were demonstrated in the left tracheo-œsophageal groove. Oxygen was administered during the operation.

The patient stood the operation well and examination on May 13th, 20 days after operation, revealed the following: (1) Resting pulse-rate 72 and regular; exercise tolerance test (as above); the pulse-rate rose to 80 and gradually dropped to 72 at the end of 1½ minutes, no irregularity developing. (2) Liver dullness to costal margin, a decrease of 2 in.; no tenderness on palpation. (3) Breath sounds weak butaudible at both bases; no adventitious sounds. (4) No œdema of ankles. (5) No albuminuria. (6) B.M.R. Reid's formula 15·5 (before operation it was 25·4).

This patient's mental outlook is completely changed. Some of her remarks are:—

"I have not felt like this for years . . . I sleep as I never hoped to sleep again . . . I have no pain in the heart, and none of the awful fluttering I used to have . . . I can now lie comfortably in any position, and do not feel the lack of air. . . Even if I don't get any better, it will have been well worth while."

I am indebted to Dr. Paul Kuhne for the medical notes and for the administration of oxygen during the operation. I am, Sir, yours faithfully,

D. LIGAT.
Buchanan Hospital, St. Leonards-on-Sea, May 14th.

X RAY CARCINOMA

To the Editor of THE LANCET

SIR,—I wish to offer certain testimony confirming the contention of Mr. W. Sampson Handley (THE LANCET, Jan. 20th, p. 120) that, if any suspicious warty area of a hand of a rontgenologist is found to be a carcinoma, the patient's safety demands a complete gland dissection, so soon as glandular enlargement can be detected in the axilla or in the supratrochlear gland of the affected side. Mr. Handley even contends that precaution is wise even in cases where the glands are normal to palpation, though it cannot then be so strongly urged. The object of his operation is to cut the main line of dissemination at an early age.

In an article entitled A Pioneer Roentgenologist (Eugene Rollin Corson, M.D.), I published (Amer. Jour. Roentg., 1931, xxvi., 759) the following testimony of Dr. Corson's experience:—

"While Dr. Corson was preparing his paper on the normal movements of the carpal bones, a work not previously done, the exposure before the fluoroscope, after a long delay of 10 years, showed up with epitheliomata on the four fingers of his left hand, three of which were subsequently amputated. At the earnest advice of Prof. Halstead, of the Johns Hopkins Hospital, he had all the lymph glands removed from the axilla, and he feels assured that this timely operation has prevented the spread of the malignancy. He would earnestly advise all sufferers from over-exposure to adopt this radical measure.

"The loss of his fingers debarred him from further surgical practice. He firmly believes that had his co-workers at that time (and he has in mind especially his friend, Dr. E. W. Caldwell, whose early death was an irreparable loss to our profession), who have since given their lives to science, had had the advantage of this early radical treatment they might still be among us to-day."

Undoubtedly Mr. Handley's advice is excellent. It is to be hoped that rontgenologists who may suffer malignant changes upon the hands will have the courage to submit to this radical procedure promptly and early. Dr. Corson is still alive and well. His operation occurred about 1906.

I am, Sir, yours faithfully,

Kansas City, Missouri, May 1st. E. H. SKINNER.

DISCLAIMERS

Mr. A. R. PATTISON writes: "In its issue of May 10th the *North Mail* published a laudatory article in extravagant phrases, referring to the work of the neurological surgeon at the Newcastle General Hospital. No name was mentioned; but it must have been obvious to anybody remotely acquainted with the facts that this article referred to me. The harmful effect of the article has been aggravated by the fact that certain charges for maintenance, which are made from time to time by the hospital authorities, have been quoted in a sensational manner as representing my customary fees. I should like to state emphatically that this

article was published entirely without my knowledge or consent. I should be obliged if you would publish this disclaimer in the usual manner."

Mr. ALECK BOURNE, F.R.C.S., writes: "My attention has been drawn to a paragraph in the lay press of May 4th which implies that I am a 'super-specialist' (whatever that may mean) in a small corner of obstetrics. I have never claimed such a doubtful distinction, it is an absurd untruth, and the paragraph was inserted without my knowledge."

UNITED STATES OF AMERICA

(FROM AN OCCASIONAL CORRESPONDENT)

FREE TREATMENT FOR EX-SOLDIERS

THE powerful "veterans' lobby" at Washington has won another victory and in doing so has overcome the still popular influence of President Roosevelt. The latter, faithful to his pre-election pledges, had vetoed the Independent Officers' Appropriation Act for the year 1935. This legislation, carried by the necessary two-thirds majority in both houses of Congress over the President's veto, involves an increased expenditure by the Veterans' Administration of $83,000,000 annually. Any veteran not dishonourably discharged who suffers from any disease, disability, or defect (whether war-connected or no), and who makes a statement under oath that he cannot pay for the treatment of same, will receive free treatment and hospitalisation or domiciliary care through the Veterans' Administration. Various other privileges are also restored to ex-combatants, both of the World War and of previous wars in which the United States has engaged. As I have previously reported, medical care is now available to all indigent persons through the provisions of Regulations No. 7 of the Federal Emergency Relief Administration. The latter regulations also provide for nursing care in the home when necessary, but make no provision for hospitalisation. The superior facilities of the Veterans' hospitals will doubtless attract to them the ailing veterans and so the practising physicians of this country will lose the fees to which they would have been entitled under Regulations No. 7.

THE PERIODIC MEDICAL EXAMINATION

The idea of a periodic examination for the apparently well is believed to have originated with Dr. Horace Dobell in England.[1] It was advanced by Dr. George M. Gould in this country in 1900. But it was not until several years later that the Life Extension Institute was founded and began to popularise the idea. The organised profession of medicine has never become reconciled to certain features of the service offered by this institute, but in 1922 the periodic examination idea was blessed and formally adopted by the American Medical Association. For 12 years its advocacy has been orthodox doctrine. Now, however, a State medical association—that of Massachusetts—has put on record its condemnation of the practice. For it they would substitute early consultation for every trivial symptom. This admittedly would detect such diseases as diabetes and pulmonary tuberculosis at a somewhat later stage than they are detected by routine exmination of the apparently healthy. Moreover, early consultation still leaves the doctor a practitioner of curative rather than of preventive medicine, whereas the routine examination, as the New York Academy of Medicine points out,[2] educates the public to look upon his medical adviser as a steady mentor for every member of the family, and not merely as a consultant in the emergencies of disease. There is no denying, however, that the great majority of doctors in this country show no disposition at present to adopt the rôle of steady mentor to those who do not complain of being unwell.

[1] See Bauer, W. W., Progress in Periodic Health Examination, A.M.A. Bulletin, March, 1934, p. 40.

IRELAND

(FROM OUR OWN CORRESPONDENT)

UNIVERSITY REPRESENTATION IN THE IRISH FREE STATE

UNDER the constitution of the Irish Free State each of the universities in the country at the time the constitution was adopted became entitled to elect three members to the Dail. The electorate of the National University of Ireland contains the names of between 4000 and 5000 voters, that of Dublin University a little over 3000. A graduate has the option of voting either in his university constituency or in his local constituency, but he has not a dual vote. The number of votes required to elect a member for the university is very much less than is required in an ordinary constituency, and this fact has raised the objection that graduates have a special privilege not possessed by the ordinary voters. The present government accepts this view, and has introduced in the Dail and carried through its second reading a Bill to abolish university representation. As the government refused to leave the measure to the free vote of the House, it will no doubt pass the Dail, but its journey to the statute-book may possibly be delayed by the Senate. In any event it only comes into operation at the first general election after it becomes law. It is not denied that the members hitherto returned by the universities have given useful service to the State. In particular the medical profession is likely to regret the disappearance of the university franchise, for since 1918, first at Westminster and later at Dublin, the University of Dublin has consistently returned one medical man among its representatives. There is no doubt that the universities, both in Great Britain and in Ireland, can and do send into public life men of a type which would be unlikely to be chosen by the ordinary constituency.

[2] The Health Examiner, December, 1933.

CHILD GUIDANCE COUNCIL.—This council offers two fellowships, each of £300 tenable for a year, for half-time work at the London Child Guidance Clinic. Particulars will be found in our advertisement columns.

TRANSFER OF HEATHERWOOD HOSPITAL, ASCOT.—The London County Council has been approached to take over the hospital for surgical tuberculosis in children built by the United Services Fund in 1922 for the assistance of ex-Service men and women. The hospital, which lies near Ascot, on the London-Reading road, provides beds for 136 children on a site 55 acres in extent, the original mansion being used as resident quarters for doctors and nurses, and there is ample space for extension. The L.C.C. was expecting to take over the hospital in 1938, but in view of the pressing need for economy on the part of the United Services Fund has agreed to do so at the end of next September.

OBITUARY

FRANCIS SEYMOUR KIDD, M.Ch. Camb., F.R.C.S.

LATE SURGEON TO THE LONDON HOSPITAL

THE death occurred on Saturday, May 12th, at his country house at Barton Stacey, Hampshire, of Mr. Frank Kidd, the well-known surgeon and urological specialist. Although he was only 56 years of age, the event was not unexpected as his breakdown in health had been prolonged.

Francis Seymour Kidd, widely known as Frank Kidd, was one of the younger members of the large family of the late Dr. Joseph Kidd of Blackheath. He was educated at Winchester and Trinity College, Cambridge, and graduated with honours in the Natural Sciences Tripos, taking later the degrees of B.Ch. in 1903 and M.B. in 1905. He completed his medical education at the London Hospital, where he held a surgical scholarship and where he afterwards filled the house appointments and became demonstrator of anatomy and surgical registrar. He did some post-graduate work at Berlin, proceeded to the M.Ch. degree and the English fellowship and this was followed by election to the staff of the London Hospital.

MR. FRANK KIDD

[Photograph by Gear

The direction of his special interest was almost at once indicated by the publication of a book on urinary surgery in 1910. At the time that this book appeared few outside a particular circle were aware of the progress that had been made in the surgery of the urinary organs, and Kidd's book drew pointed attention to the great advances made during the ten years previous to its publication which were manifested both in diagnosis and treatment. It was a chronicle of new knowledge, made by a man intimately associated with its development. During those ten years the technique for catheterisation of the ureters had been simplified, allowing an estimate of the physiological power of each kidney to be made more readily; at the same time bacteriological research associated with the urinary tract had added to the knowledge of the infections of this system, while the introduction of the X rays for the detection of calculi in the kidney, ureter and bladder was increasing in a practical manner the surgeon's capacity of diagnosis. The great developments of the surgery of the prostate now followed, and all these aspects of urology up to date Kidd described in a book which was also excellently arranged and easy to read. He obtained, and rightly, a very large consulting and operating practice, and from time to time wrote out his experiences in an informing manner in the columns of the medical journals and in well-known compilations and encyclopædias. His clinical records, though numerous, were never made without reason—they always contained a lesson. For example, in describing the case in our columns of the largest calculus which he had ever removed from the pelvic portion of the ureter—the stone measured 2½ in. in the long diameter and 1 in. in the short diameter (see THE LANCET, Jan. 17th, 1920, p. 151)—he noted the absence of preliminary indications of the condition, and concluded from his own work that as a general rule the larger the stone the fewer the symptoms; a practical hint of the first importance. Similar references to medical literature throughout a long period might be given in testimony of Kidd's surgical judgment, operative dexterity, and also to his wide reading. For instance, as president of the section of urology of the R.S.M. he delivered an address on purpura of the urinary tract (vide THE LANCET, May 5th, 1928) in which the difficulties of diagnosis were analysed and the ætiology and treatment discussed in reference to a series of illustrative cases. The address introduced the audience to much new bacteriological and technical knowledge, while its practical message was to give reasons for the fact that urologists had often been led to remove the kidney on suspicion of non-existent neoplasms, whereas neoplasms of the kidney are both comparatively rare and when present do not form a common cause of hæmaturia. While still assistant surgeon to the London Hospital he took charge of a genito-urinary department at the hospital. He became full surgeon to the institution some 15 years ago, and was also surgeon to St. Paul's Hospital for diseases of the genito-urinary organs and skin, where much of his operative work was done.

Mr. Frank Kidd married Stella, daughter of the late Mr. W. Williams, of Langland, and leaves three sons. He had been, when at Winchester, a prominent footballer, and later obtained his University blue for hockey and became a member of the English team in some international contests.

MEREDITH YOUNG, M.D. Edin., D.P.H.

LATE M.O.H., CHESHIRE COUNTY

WE regret to record the death of Dr. Meredith Young which occurred at Chester on May 7th at the age of 64.

Meredith Young was born at Waterloo, Liverpool, the son of the Rev. James Young, and was educated at Bradford Grammar School and at the University of Manchester, completing his professional training in Edinburgh. He graduated as M.B., C.M. Edin. in 1892, taking honours in a series of subjects, and immediately entered the public health service. From 1892 to 1897 he was M.O.H. for Brighouse, during the next three years he acted in the same capacity at Crewe, from 1900 to 1908 he was M.O.H. for Stockport, and then, following a year of service as M.O.H. for the metropolitan borough of Marylebone, he became M.O.H. for Cheshire, a post which he held for 25 years, retiring in 1932.

In the course of filling these appointments Meredith Young proceeded to the M.D. Edin., and took a public health diploma at the University of Manchester and also in London, while in 1907 he was called to the Bar of Lincoln's Inn. Out of his great experience he found that he had the material for much informative authorship and lecturing. He wrote on the clinical and public health aspects of small-pox, on the control of common lodging-houses in the *British Medical Journal*, and on the methods of treating infective conditions of the throat in *The Lancet* and *The Practitioner*, while in 1916 he published an extension of lectures delivered in a special course of

teaching for teachers of defectives at the summer school at Birmingham. This interesting book was directed to the attention of all interested in the education, treatment, and after-care of the mental defective, and to that extent was addressed to the lay reader rather than to the medical profession, but medical men who read the book must have appreciated such sections as those in which the stigmata of degeneration are set forth and speech defects are dealt with. He lectured also at the University of Manchester on school hygiene, was an examiner for the St. John Ambulance Association, and an Esquire of the Order of St. John of Jerusalem, and he served as president of the Chester and North Wales Medical Society. Dr. Meredith Young's life was one of public service and he deservedly won public appreciation.

JAMES CAMPBELL McCLURE, M.D. Glasg.

LATE PHYSICIAN TO THE FRENCH HOSPITAL

THE death occurred suddenly on May 3rd of Dr. Campbell McClure, who was well known to a large professional circle through his varied interests and his many appointments in Glasgow and London.

James Campbell McClure was born in 1873, son of a Glasgow solicitor, and received his preliminary education at the Kelvinside Academy, proceeding to the University for his medical education. He was a prominent student, graduated M.B., C.M. in 1896, and was shortly afterwards appointed assistant physician to the Western Infirmary, Glasgow, and to the Sick Children's Hospital. He was physician to the Belvidere Hospital for Fevers, and recorded his experiences in a Handbook of Fevers, containing much practical information; he acted as assistant to the regius professor of medicine in Glasgow for ten years, and through a considerable period occupied a prominent professional position in the city.

Shortly before the war McClure came to London, and in 1912 was appointed physician to the Margaret-street Hospital for Consumption and his early intentions were to practise as a specialist in tuberculosis. He wrote in various places on aspects of the disease, and was for a time a prominent member of the Tuberculosis Society of Great Britain, over which for a period he presided. He became interested particularly in nervous developments among his patients and the influence upon them of the change of scenery and environment, he wrote upon the symptom-complex which he termed neurasthenic gastrica, and hence came to take an active part in the study of hydrology. He acted as secretary and later as president of the section of balneology and climatology of the Royal Society of Medicine, a section now merged in that of physical medicine, and personally visited many of the British health resorts where his views were always received with attention. Many foreign spas were equally familiar to him and all projects for forwarding internationalism in medicine held a strong appeal for him. At the French Hospital in London, on the staff of which he was for over 20 years, McClure had full opportunities for displaying his various gifts; his clinical knowledge in regard to tuberculosis and fevers, and his intimate knowledge of the French language, made him an admirable officer of the institution. There is no doubt that his services contributed greatly to its development, a fact which was recognised by the receipt of decorations both from the French and Belgian Governments, and by his appointment as physician to the French Consulate.

Dr. Campbell McClure married in 1906 Louise Marie, youngest daughter of M. Jules Bué, late Taylorian Reader in French at Oxford, and leaves two sons.

WILLIAM ALEXANDER GORDON RUSSELL, M.B., C.M. Aberd.

THE death took place on April 27th of Dr. W. A. Gordon Russell at his residence in Wingate, Durham, in the sixty-fifth year of his age. He was the son of a clergyman in Orkney and one of four brothers, all of whom entered the medical profession. He received his professional education at the University of Aberdeen where he graduated in medicine in 1892. After a short experience in general practice at Kirbymoorside, he established himself in Wingate in 1894, where he soon obtained a large connexion, becoming prominent in many public organisations connected with the life of the district and the colliery interests. He was a medical officer in the volunteers of long standing and saw service in South Africa during the Boer War, and in Malta during the recent war he held the rank of acting Major R.A.M.C.(T.). He was surgeon to the police and medical officer to the Easington Infectious Diseases Hospital, and throughout his professional life was associated with the development of ambulance work. He leaves a widow and a large family, one son being his partner.

DR. HAIG FERGUSON

Dr. Oliphant Nicholson writes: "The shadow of a great sorrow hangs over Edinburgh, for we have lost James Haig Ferguson. I do not propose to speak of the scientific merits of the man, for others will do this adequately; I wish simply to obtrude this short personal note, and I am only too conscious that I am trying to say what many others could say better. It is not easy to say what the qualities in the man were, that gave him the remarkable, and I might truly say, unique position he held in the minds of a very wide circle of patients and friends, in the minds of his numerous colleagues, and in the imagination and hearts of his students and nurses. Personality—that quality which baffles all definition—makes the first and most lasting impression upon all of us, and Dr. Haig Ferguson's personality was the most wonderful one I have ever seen. His charming smile, and wonderful softening of the eyes, must have endeared him to so many thousands. He believed in the necessity and honourableness of work, and if anyone did 'a day's work and a man's work' he did—splendidly, cheerfully, and well, and with infinite tenderness. Perhaps only those admitted to the innermost shrine of a somewhat reserved man, knew Ferguson for what he was—wise in counsel, courageous in trial, and in friendship always most loyal."

DR. JAMES PATRICK FENNELL, who died on May 9th at Eastbourne, aged 83 years, had practised for over 30 years at Dalston, but for the last ten years had been living in retirement. He qualified in 1878 as L.R.C.P.I. & L.M., L.R.C.S.I., and was for a period resident surgeon, Stourbridge Dispensary.

NORTH LONSDALE HOSPITAL.—This hospital, which dealt with 1775 in-patients and 4607 out-patients—an increase of 182—closed 1933 with a credit balance of £94. Road accidents accounted for 33 of the patients admitted to the wards; they cost over £214, of which only £16 11s. 6d. was recovered.

MEDICAL NEWS

University of Cambridge

The degree of M.B. has been conferred on R. W. Billington and M. Westwood. The titles of the degrees of M.B. and B.Chir. have been conferred on Alice Barbara Field.

University of Oxford

Dr. R. E. Havard, biochemist to the department of experimental pathology and cancer research of the University of Leeds, has been elected to the Schorstein research fellowship for 1934.

Cineradiography at Oxford

On May 3rd an audience of over 200 attended a demonstration of X ray cinematograph films given in the large lecture theatre of the University Museum at Oxford by Dr. Russell J. Reynolds, of London, and Dr. Robert Janker, of Bonn. A demonstration in London was reported in our issue of May 5th (p. 975).

University of Birmingham

At the annual degree ceremony on June 30th the honorary degree of LL.D. will be conferred upon Dr. C. A. Lovatt Evans, F.R.S., Jodrell professor of physiology at University College, London.

Medical Prayer Union

The annual missionary breakfast of this union will be held at the refectory, University College, Gower-street, London, W.C., at 8 A.M. on Wednesday, May 30th. Mr. W. McAdam Eccles will be in the chair and an address will be given by Dr. Florence Robinson. The hon. secretary is Dr. Tom Jays, Livingstone College, London, E.10.

Royal College of Surgeons of England

A meeting of the council was held on May 10th with Sir Holburt Waring, the president, in the chair. Diplomas of membership were granted to A. G. W. Branch (Bristol) and V. P. Gupta (Lucknow and West Lond. Hosp.), and to 164 of the candidates whose names were given in our issue of May 5th as recipients of the L.R.C.P. (excepting T. S. Heslop and Maxime Shun-Shin). A diploma in gynæcology and obstetrics was granted jointly with the Royal College of Physicians to K. S. Jayakar, of Bombay.

Prof. C. A. Pannett, surgeon to St. Mary's Hospital, was re-elected a member of the court of examiners and the resignation from the court of Mr. Claude Frankau was announced. Mr. Laurence O'Shaughnessy was reappointed college research scholar, and Mr. G. C. Knight and Dr. David Slome were reappointed Leverhulme scholars. Prof. F. Wood-Jones was appointed assessor in anatomy, Prof. W. A. Osborne assessor in physiology, and Mr. W. E. A. Hughes-Jones superintendent of dissections at the primary fellowship examination to be held at Melbourne next November. The president was appointed a member of the governing body of the British Post-Graduate Medical School for a year from July, 1934.

University of Liverpool

On May 11th, in commemoration of the centenary of the medical school, the honorary degree of D.Sc. was conferred on Dr. H. R. Dean, professor of pathology in the University of Cambridge; Sir Thomas Lewis, F.R.S., physician to University College Hospital, London; Mrs. May Mellanby, investigator for the Medical Research Council; and Mr. Wilfred Trotter, F.R.S., surgeon to University College Hospital. Recipients of the honorary degree of LL.D. included Dr. W. Blair Bell, professor of obstetrics and gynæcology in the university from 1921 to 1931; Prof. Henry Briggs, the previous holder of the chair (1898–1921); Dr. H. R. Hurter, past president of the Liverpool Medical Institution; and (in absentia) on Dr. W. S. Paget-Tomlinson, F.R.C.P., lately chairman of the public health committee of Westmorland, who is believed to be the senior medical student of Liverpool. Dr. Paget-Tomlinson attended the school in the late 'sixties.

A commemorative address was delivered by Dr. John Hay, professor of medicine in the university.

Commonwealth Fund

Dr. A. G. M. Weddell, of St. Bartholomew's Hospital medical school, has been awarded from this fund a fellowship in medicine which is tenable for two years at the University of Rochester, U.S.A.

Gordon Hospital for Rectal Diseases

Mr. A. J. Dewar has given £10,000 towards the £100,000 rebuilding fund of this hospital in the Vauxhall Bridge-road, London. Mr. Dewar was elected president of the hospital last year.

Pistany Spa

This Spa has established an agency at 25, Cockspur-street, London, where doctors and their patients can obtain information. The Spa is a centre in Czechoslovakia for the treatment of rheumatism, arthritis, sciatica, and gout.

British Psychological Society

A meeting of the medical section of this society will be held at the house of the Medical Society of London, 11, Chandos-street, W.1, on Wednesday, May 23rd, at 8.30 P.M. Dr. Karin Stephen will read a paper on introjection and projection guilt and rage.

West Kent Medico-Chirurgical Society

The annual dinner and dance of this society will be held on Thursday, May 24th, at 7.30 P.M., at Chiesman's Restaurant, High-street, Lewisham, S.E. The honorary secretary is Dr. C. J. B. Buchan, Ledard, 267, Baring-road, Grove-park, S.E.12.

Tribute to Mr. R. H. Burne

A complimentary dinner to Mr. R. H. Burne, F.R.S., was held at the Langham Hotel, London, on May 10th, on the occasion of his retirement from the physiological curatorship of the museum of the Royal College of Surgeons of England after 42 years in the service of the college. The chair was taken by Sir Holburt Waring, the president, and among those present were Sir Cuthbert Wallace, Sir Arthur Smith Woodward, Dr. Tate Regan, Sir Charles Ballance, Prof. E. Barclay-Smith, Prof. William Wright, Sir Buckston Browne, Dr. Monckton Copeman, Prof. E. S. Goodrich, and Mr. C. Forster-Cooper. Mr. Burne's health was proposed by Sir Holburt Waring, supported by Sir Arthur Keith and Sir Peter Chalmers Mitchell.

Society of Medical Officers of Health

A meeting of this society will be held at the house of the society, 1, Upper Montague-street, Russell-square, London, W.C., on Friday, May 25th, at 5 P.M. Dr. H. Stanley Banks, Dr. E. H. R. Harries, and Dr. William Gunn will open a discussion on current methods of control of the common infectious diseases.

School Medical Service Group.—A meeting of this group will be held on Friday, June 1st, at 5.30 P.M., at the house of the society, when Dr. Temple Gray will speak on the bacteriology of diphtheria. On Thursday, July 19th, Dr. Gerald Slot will give an address on absenteeism in defective school-children. This meeting will take place at 81, Addison-road, London, W., at 5.15 P.M.

Maternity and Child Welfare Group.—The provincial meeting of this group will be held in Glasgow from May 24th to 26th.

Society for Relief of Widows and Orphans of Medical Men

At the annual general meeting held on May 8th, the president, Mr. V. Warren Low, being in the chair, the report of the directors for 1933 was presented and adopted. During the year a sum of £4993 18*s.* 10*d.* had been distributed as grants to 53 widows and 6 orphans. Each widow over 75 years received £90, over 65 years £85, under 65 years £70, each orphan £60. Included in the amount distributed was £442 3*s.* allotted to orphans to enable them to continue their school education or start on some professional career. Membership is open to any registered medical man who at the time of his election is resident within a 20-mile radius of Charing Cross. At the present time the widow of a member left with an income of under £125 is eligible for a grant. Information from the secretary at 11, Chandos-street, London, W.1.

The Cambridge Graduates' Medical Club

The annual dinner of this club was held at the Langham Hotel, London, on Wednesday, May 9th, with the president of the club, Dr. H. Morley Fletcher, presiding. Although the rule of the club admitted no speeches, the president broke the rule by telling the guests in a few words that this was the fiftieth dinner of the club, and took occasion to make some interesting references to its past history. At the close of the dinner Prof. Langdon Brown proposed Dr. Morley Fletcher's health.

University of London Medical Graduates' Society

The annual meeting of this society was held at the Langham Hotel, London, on May 8th. Mr. W. McAdam Eccles was elected president, Sir Charlton Briscoe honorary treasurer, and Mr. W. E. Tanner joint honorary secretary. At the dinner which followed, Sir Henry Brackenbury was the guest of the evening and the retiring president, Lady Barrett, replied to the toast of the society.

Longer Training for Blind Masseurs

The course for blind students at the massage school of the National Institute for the Blind is to be extended from 18 months to two years. The extension is considered necessary because of the wide range of subjects taught which now include massage, remedial exercises, and medical electricity.

Diet in Hotels at a Spa

A scheme has been evolved at Bath whereby visitors requiring special diet will receive a card from their physician which they will hand to the head waiter or manager of their hotel, who will then see that the instructions are carried out. The names of dishes and drinks to be avoided will be deleted from the list.

East-End Maternity Hospital

The clinical report of this hospital, which is in Commercial-road, states that last year there were 1403 in-patients and 369 out-patients, a total of 1772; there were no maternal deaths. There was one case of eclampsia and one requiring Cæsarean section.

The Guardianship Society

This society, which has its headquarters at Brighton, has now been in existence for 21 years. Its work for the care and the supervision of the mentally and physically defective is well known, and no fewer than 84 public authorities are now invoking its assistance. In 1933 there were 1077 patients on the books, and in addition 170 cases were visited voluntarily, helped, or advised. Besides this after-care work the society has for nine years maintained a clinic for nervous disorders with Dr. G. H. Harper-Smith as mental specialist, where 65 new patients have attended during the year.

A Visit to a Wild Flower Sanctuary

The Green Cross Society which, as already announced (March 24th, p. 662), is organising a visit to Norway for the study of wild flowers, informs us that the start from Newcastle-on-Tyne has been postponed until July 14th, to suit the convenience of the Norwegian botanists, Dr. E. Christophersen and Mr. Johs. Lid, who are to guide the party. Ample opportunity is offered for the exploration of sanctuaries where rare plants have survived from the ice age. The inclusive cost of the ten days' trip, Newcastle to Newcastle, is 20 guineas, or 14 guineas for any willing to travel third class from Newcastle to Bygdin via Oslo.

British Institute of Radiology

The annual general meeting of this institute will be held on Thursday, May 31st, at the hall of the institute, 32, Welbeck-street, London, W., at 8 P.M. Mr. H. A. Edgerton will read a paper on the measurement of X ray quality by a photographic method and Mr. A. J. Minns one on the technical aspects of short-wave therapy.

A medical meeting will be held on Friday, June 1st. A visit will be paid to the Cancer Hospital, Fulham-road, London, S.W., at 11 A.M., and at 5 P.M. Dr. J. V. Sparks will give a short communication on radiographic demonstration of calcification in cardiac valves. A series of paper films by Dr. Sparks with special reference to chest cases will be on view at the institute on Thursday and Friday, and members are invited to report their experiences with paper negatives.

Public Health Services in South Africa

During the debate on the Budget in the Union House of Assembly, Capetown, on April 17th, Mr. Jan Hofmeyr, the Minister of the Interior, made a statement on the public health services of the Union. These services have lately been largely curtailed, but are now not only to be restored but largely extended. Mr. Hofmeyr outlined among other things a campaign against tuberculosis embracing the establishment of subsidised clinics in all the larger towns, the enlargement of the Nelspoort Sanatorium to serve the whole Union, and hospital provision for advanced cases. The scheme is of particular interest to the Transvaal, where 50 beds at the Springkell Sanatorium are being placed at the disposal of the health department, and where accommodation is being provided for non-European cases at Rietfontein. The Minister's new policy makes provision for the welfare of the native and coloured people, and a fact-finding commission is to be set up. At the same time native medical "aids" are to be trained and appointed to combat the excessive infantile and maternal mortality in the Union.

Royal Medical Benevolent Fund

During the first quarter of this year £3674 has been voted in grants as against £3489 during the corresponding period of last year. The following are particulars of a few cases recently helped.

M.B., aged 47, married, daughter age 10. On leaving the army after the war, the applicant had no practice to return to, and having developed disseminated sclerosis he was not capable of undertaking the medical work of an arduous practice. A county council in August, 1930, appointed him medical officer, in which post he made a great effort to carry on. His condition did not improve, and finally he had to resign in August, 1933. He has a pension of £100, and his wife's private income is £20. Fund voted £40 in four instalments for a period of one year.

Widow, aged 32, of M.B. Her husband served abroad and died from tuberculosis at the age of 33 in February, 1934, leaving the widow and two children, a boy of 7 and a girl of 5. The widow is entitled to a pension of £60 and allowances for the children of £45. A life policy when invested will yield £35. Her total income is £140. No relations can help. Fund granted £26 in four instalments over a period of one year.

Daughter, aged 69, of M.R.C.S., has been working for her living for over 30 years. She and a cousin ran a boarding house up to two years ago when they had to give up owing to local competition. They moved to a smaller house with a view to taking lodgers. Only a little money is now earned. The cousin has the old age pension of £26 but the applicant is not eligible till next year. Fund grant £26 in four instalments over a period of one year, and is endeavouring to get other assistance for these two ladies.

Cheques should be made payable to the hon. treasurer of the fund, 11, Chandos-street, Cavendish-square, London, W.1.

National Association for the Prevention of Tuberculosis

The twentieth annual conference of this association will be held in the County Hall, Westminster Bridge, London, S.E., on June 14th and 15th under the presidency of Sir Robert Philip, and will be opened by Sir Hilton Young, the Minister of Health. The conference will take the form of an all-round discussion on the national tuberculosis scheme, and it will consider the national system of combating tuberculosis which was inaugurated by the report of the departmental committee on tuberculosis (1912–13). The first address will be given by Lord Astor, who was chairman of this committee. Other speakers at the opening session will be Dr. A. Salusbury MacNalty, senior medical officer of the Ministry of Health, Dr. N. D. Bardswell, principal assistant medical officer to the London County Council, and Sir John Robertson, professor of public health in the University of Birmingham. In the afternoon the discussion will be mainly concerned with the tuberculosis dispensary and the speakers will be Dr. G. Lissant Cox, central tuberculosis officer of the Lancashire county council, and Dr. Melville Dunlop, of the tuberculosis department of the University of Edinburgh. At 10 A.M. on June 15th the discussion will be continued and will deal with residential institutions. The speakers will include Dr. James Watt, Dr. R. C. Wingfield, Dr. J. B. McDougall, and Dr. F. R. G. Heaf. The names of delegates and private members who wish to attend should be sent as soon as possible to the secretary of the association, Tavistock House North, Tavistock-square, London, W.C.1.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

Unemployment Bill

ON May 14th in the House of Commons Sir H. BETTERTON (Minister of Labour) moved the third reading of the Unemployment Bill.

Mr. LAWSON moved:—

"That this House declines to assent to the third reading of a Bill which removes from Parliament its direct responsibility towards those who are denied employment as a result of the present industrial system, fails to recognise the disquieting evidence of malnutrition and to provide adequate maintenance for the unemployed and their dependents, confirms and perpetuates a vicious means test originally imposed as a temporary expedient, throws upon a section the burden of a debt which should be borne by the whole community, and, by exacting a contribution from local authorities in aid of a national service, inflicts hardship upon areas where, through national neglect, industry has been allowed to decay."

After debate, the motion for the rejection of the Bill was negatived by 421 votes to 67 and the Bill was read the third time.

Road Traffic Bill

The Road Traffic Bill was further considered by a Standing Committee of the House of Commons on May 8th.

Mr. STANLEY said that although he had great confidence in the effect of the speed limit he did not claim the knowledge of the future and the absolute certainty of those who opposed the clause and said that it was bound to fail altogether. He was prepared to face the possibility that it might prove a failure. If it should prove a failure it would be better that it should be allowed to lapse rather than that it should be allowed to drag on a miserable existence years after it had been found to be unsuccessful. But three years was too short a time in which to bring the speed limit into force and to map out the areas to which it should apply, and if the mover of the amendment would agree to make the experimental period one of five years ending in 1939 he would be prepared to accept it.

Lieut.-Colonel MOORE-BRABAZON agreed to this suggestion, and the amendment making the speed limit applicable to the end of 1939 was agreed to.

When a general discussion on the speed limit in the built-up areas and on the definition of those areas took place, Sir E. GRAHAM-LITTLE said he hoped that the Minister would not be put off his intention to use every possible likely device to decrease the toll of accidents. He particularly deprecated any suggestion that they ought to wait and see the effect of one process and then try another process and so on. Speaking as a medical man, he would ask the members of the Committee who had raised such suggestions whether, supposing they were desperately ill, they would accept the suggestion from a physician that they should try one remedy and see how it worked and then try another instead of trying everything that medical science could suggest. He hoped that the speed limit would not be entirely at the mercy of Orders, but that there would be some definite settled principle which would be maintained.

DOCTORS AND THE SPEED LIMIT

In the House of Commons on May 15th, in considering Clause 3 of the Road Traffic Bill which proposes to give exemption from the speed limit to vehicles used for fire brigade, ambulance, or police purposes, Mr. T. SMITH proposed an amendment extending similar exemption to cars used by medical men. He said that the purpose of the amendment was to meet the needs of doctors who were summoned to urgent cases.—Mr. LLEWELLYN JONES said he thought that the result of the proposed amendment might be that any doctor would be able to exceed the speed limit at any time and set up the defence in the event of a prosecution that he was on his way to an urgent case.—Mr. OLIVER STANLEY (Minister of Transport) said that he could not recommend the Committee to accept the amendment, although he quite appreciated the purpose in view. He had tried to find some way in which this matter could be met, but he had found great difficulty. It would be quite impossible for the police to detect, when a car was going along the road, whether a medical man was going to an emergency case or not. The exemption proposed in the amendment might relieve a doctor from a prosecution, but he might be delayed by the police and everyone was anxious to avoid delay in cases of emergency.—Mr. GRENFELL suggested that the matter might be met by doctors being allowed to carry distinctive marks on the roads.—After further discussion, the amendment was withdrawn.

HOUSE OF COMMONS

WEDNESDAY, MAY 9TH

Verminous Houses in Sheffield

Mr. HAMER RUSSELL asked the Minister of Health whether he was aware that the medical officer of health of the city of Sheffield, although possessing abundant evidence of bug-infested property, had no power to eradicate this nuisance, and that alternative accommodation could not be sanctioned for the tenants concerned on the ground that the property was not slum property; and whether, in view of the danger to public health arising from the existence of bug-infested property, he would make investigations and, if advisable, issue compulsory orders.—Mr. SHAKESPEARE, Parliamentary Secretary to the Ministry of Health, replied: Under Part IV. of the Public Health Act, 1925, which is in force in the city of Sheffield, the corporation have power to secure the cleansing of verminous premises, and when this is done it is not necessary to provide alternative accommodation. My right hon. friend will be glad to make inquiries about one case, which my hon. friend has brought to his notice, in which it is suggested that cleansing is impossible owing to the nature of the premises infected.

THURSDAY, MAY 10TH

Female Officers in Prison Service

Colonel GOODMAN asked the Home Secretary how many appointments to matronship had been made from candidates outside the prison service during the last two years to the nearest convenient date; the number of applicants for each of the posts from established female officers; and if in future appointments he would take into consideration the experience gained by years of contact with all classes of female prisoners on the part of existing female officers.—Sir JOHN GILMOUR replied: During the two years ended 30th April ten appointments were made to the post of matron in male Borstal institutions, seven of them being filled by persons from outside the prison service and three by prison officers. In the course of making selections for these appointments thirteen applicants from among prison officers were considered. The qualifications and experience of such officers are always taken into account, but service in a women's prison is not necessarily a qualification for the very different work of matron in a Borstal institution for boys and young men.

Infant Mortality in Kensington

Mr. JAMES DUNCAN asked the Minister of Health (1) if he was satisfied that the steps taken to deal with infant mortality in Kensington were adequate, and (2) what steps were being taken by the Kensington borough council to reduce the infant death-rate in North Kensington.—Sir HILTON YOUNG replied: I am informed that the subject of infant mortality in Kensington has at all times received careful attention and study by the borough council and has recently been the subject of a special investigation by them. The council have provided a comprehensive maternity and child welfare service, which

has recently been augmented by the appointment of a special whole-time medical officer, and my information is that the service is constantly under review by the borough council. I am satisfied with the nature of these measures.

Mr. WEST: Does not the Minister realise that the abnormal death-rate in Kensington of 120 per 1000 is largely due to the overcrowding and slum conditions in Kensington, and does he think that the Kensington borough council have done their duty in this respect? If he does, nobody else does.

Sir HILTON YOUNG: As regards the last part of the supplementary question I would refer the hon. Member to the answer I have just given. As regards the remainder of the question while not accepting the implications of his question regarding this particular borough, undoubtedly the effects of slum conditions upon infant mortality are direct.

MONDAY, MAY 14TH

Reductions in Indian Army Officers

Sir ALFRED KNOX asked the Secretary of State for India, with regard to the schemes submitted by the Government of India for axing 600 officers of the Indian Army by September, 1935, if he could say what terms of retirement would be granted.—Sir S. HOARE replied: I am not yet in a position to make any statement.

The Price of Insulin

Mr. HERBERT WILLIAMS asked the President of the Board of Trade what change had taken place recently in the price of British-made insulin and imported insulin.—Dr. BURGIN, Parliamentary Secretary to the Board of Trade, replied: Some reductions in the price of British insulin were made in January. In the last few days the price of the brand of British insulin and of one brand of imported insulin has been reduced from 1*s.* 5*d.* to 1*s.* 4*d.* per 100 units.

Sir FRANCIS FREMANTLE asked if it was not true that it was also sold to poor-law authorities at 1*s.* per 100 units.

Dr. BURGIN: That is the fact.

Housing and Slum Clearance

Mr. LIDDALL asked the Minister of Health how many houses had been provided under the Housing Act, 1933, by arrangement with the building societies; and how many houses had been completed under slum-clearance schemes.—Mr. SHAKESPEARE, Parliamentary Secretary to the Ministry of Health, replied: Up to March 31st, 1934, guarantees had been given under section 2 of the Act of 1933 in respect of 1631 houses. In addition, guarantees in respect of 8400 houses have either been promised or are the subject of active negotiations with the local authorities. Up to the same date 17,569 houses had been completed under the Housing Act, 1930, for the purpose of rehousing persons displaced under the provisions of the Act. In addition, 14,201 houses were provided up to March 31st, 1934, to rehouse persons displaced under improvement and reconstruction schemes prior to the Act of 1930.

Rural Water-supply Schemes

Mr. LEVY asked the Minister of Health how many applications had been received for grants in aid of rural water-supply schemes; in how many cases such grants had been made so far; and whether complaints had been made of the restrictive character of the conditions governing such grants.—Mr. SHAKESPEARE replied: Applications have been received from 37 rural district councils in respect of 175 parishes and from 4 urban district councils. The total cost of the schemes involved is £615,000. The applications are under consideration. Apart from representations made by two county councils that contributions by them should not be made a condition of grant, my right hon. friend has received no complaints as to the conditions.

TUESDAY, MAY 15TH

Methylated Spirit Drinking

Mr. BURNETT asked the Secretary of State for Scotland whether he proposed to take legislative action in view of the representations which he had received as to the prevalence of the drinking of mineralised methylated spirits and surgical spirit.—Mr. SKELTON (Under-Secretary of State for Scotland) replied: Before considering whether further measures restricting the sale of methylated and surgical spirits are necessary, it is proposed to await the results of the experiment which was initiated on March 15th last with the object of rendering surgical spirit undrinkable.

Firedamp Detection in Mines

Mr. CONANT asked the Secretary for Mines whether his attention had been called to the decision of a colliery company in the Midlands to instal automatic fire-damp detectors for the use of workmen underground; and whether he could make a statement in regard to this development.—Mr. E. BROWN replied: I am informed that the Staveley Coal and Iron Company, Ltd., after carrying out pit trials of the Ringrose automatic fire-damp detector at their Markham Colliery, have now decided to equip with this detector each of the conveyor faces in two of the seams, and that the company will probably equip the third seam of the colliery in a similar way at a later date.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

TUESDAY, May 22nd.

Medicine. 5 P.M. Annual General Meeting. Dr. D. Robertson: A New Electrocardiograph Employing the Cathode Ray Oscillograph as the Recording Device. Dr. F. H. Smirk: The Functional Pathology of Advanced Nephritis. Dr. A. Kendrew: Intra-thoracic and Intrapericardial Pressures in Man. Dr. A. J. Campbell: Diaphragmatic Paralysis as a Therapeutic Measure.

WEDNESDAY.

Comparative Medicine. 5 P.M. Annual General Meeting. Coryne Bacterium Infections, with Especial Reference to Caseous Lymphadenitis of Sheep. Discussion to be opened by Prof. J. Basil Buxton and Dr. H. R. Carne.

Surgery. 5 P.M. Annual General Meeting.

THURSDAY.

Urology. 5.30 P.M. Annual General Meeting. Dr. J. A. Weijtlandt (Amsterdam): Endometriosis of the Bladder. 2 to 5.30 P.M. Exhibition of Urological Instruments.

FRIDAY.

Disease in Children. 5 P.M. (Cases at 4.30 P.M.) Annual General Meeting. Cases and specimens. Dr. J. C. Hawksley (for Dr. H. Thursfield): 1. Congenital Syphilis and Splenic Anæmia in an Infant. Dr. L. E. H. Whitby and Dr. Alan Moncrieff: 2. Cooley's Anæmia. Mr. F. C. Pybus: 3. Chronic Intussusception. Mr. David Levi: 4. Unilateral Post-operative Chronic Parotitis. Dr. Hilda Stoessiger: 5. Hæmolytic Septicæmia in Mastoid Disease with Recovery. Dr. Donald Bateman (for Dr. Donald Paterson): 6 and 7. Familial Hepato-splenomegaly. Dr. R. W. B. Ellis (for Dr. E. A. Cockayne): 8. Precocious Puberty in a Boy of 5. 9. Renal Rickets Associated with Dilatation of Ureters and Urethral Valve. Dr. G. Stanley Rogers (for Dr. A. G. Maitland-Jones): 10. Congenital Partial Absence of the Sacrum. Dr. J. N. O'Reilly: 11. Healed Miliary Tuberculosis of the Lungs. Other cases.

Epidemiology and State Medicine. 8 P.M. Annual General Meeting. Dr. Percy Stocks: The Association between Mortality and Density of Housing.

MEDICO-LEGAL SOCIETY, 11, Chandos-street, W.

THURSDAY, May 24th.—8.30 P.M., Mr. W. J. Foster: Incapacity for Work within the Meaning of the National Health Insurance Acts. A discussion will follow.

TUBERCULOSIS ASSOCIATION.

FRIDAY, May 25th (at the Manson House, 26, Portland-place, London, W.), 5.15 P.M., A discussion on the Palliative Treatment of Cases of Advanced Pulmonary Tuberculosis to be opened by Dr. C. D. Agassiz and Dr. Ernest Ward. 5.15 P.M., Dr. J. Stephani (Montana, Switzerland): Some Observations on the Value of Improved Radiological Technique in Pulmonary Tuberculosis.

ST. JOHN'S HOSPITAL DERMATOLOGICAL SOCIETY.

WEDNESDAY, May 23rd.—4.15 P.M. (at 49, Leicester-square), Annual General Meeting and Clinical Cases.

SOCIETY OF MEDICAL OFFICERS OF HEALTH, 1, Upper Montague-street, W.C.

FRIDAY, May 25th.—5 P.M., Discussion on Current Methods of Control of the Common Infectious Diseases, to be

opened by Dr. H. Stanley Banks, Dr. E. H. R. Harries, and Dr. William Gunn.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, May 21st, to SUNDAY, May 27th. MAUDSLEY HOSPITAL, Denmark Hill, S.E. Course in Psychological Medicine; afternoons.—ST. JOHN'S HOSPITAL, Leicester-square, W.C. Course of Dermatology: afternoons and evenings.—HOSPITAL FOR CONSUMPTION, Brompton, S.W. Week-end Course in Chest Diseases; all day, Sat. and Sund.—PANEL OF TEACHERS Individual clinics in various branches of medicine and surgery are available daily.—Courses of instruction arranged by the Fellowship of Medicine are open only to Members and Associates.

UNIVERSITY COLLEGE, Gower-street, W.C.
TUESDAY, May 22nd, and following THURSDAY and FRIDAY, —5.15 P.M., Prof. W. Vogt (Zürich): Experimental Vertebrate Embryology.

KING'S COLLEGE HOSPITAL, Denmark Hill, S.E.
THURSDAY, May 24th.—4.30 P.M., Prof. W. W. C. Topley: Principles of Immunisation and Preventive Disease.

ST. MARY'S HOSPITAL INSTITUTE OF PATHOLOGY AND RESEARCH, Paddington, W.
THURSDAY, May 24th.—5 P.M., Prof. E. N. Da C. Andrade: The Physics of the Spectrum and its Medical Bearing with Special Reference to Ultra-violet.

ST. PAUL'S HOSPITAL, Endell-street, W.C.
WEDNESDAY, May 23rd.—4.30 P.M., Dr. J. K. Hasler: Low Spinal Anæsthesia in Genito-urinary Surgery.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.
TUESDAY, May 22nd.—5 P.M., Dr. J. E. M. Wigley: Napkin Area Eruptions.
THURSDAY.—5 P.M., Dr. A. M. H. Gray: Sclerema.
FRIDAY.—5 P.M., Dr. W. J. O'Donovan: Tuberculosis of the Skin.

HOSPITAL FOR EPILEPSY AND PARALYSIS, Maida Vale, W.
THURSDAY, May 24th.—3 P.M., Dr. W. G. Wyllie: Demonstration.

UNIVERSITY OF BIRMINGHAM.
WEDNESDAY, May 23rd.—4 P.M. (in the Lecture Theatre of the Medical Faculty Buildings), Prof. J. B. S. Haldane: Contributions of Genetics to Medical Science. Last of three lectures.
THURSDAY.—4 P.M. (in the Medical Theatre), Dr. H. Guy Dain: Regulations appertaining to National Insurance Practice (last of two lectures).
FRIDAY.—3.30 to 5 P.M. (at the Queen's Hospital), Dr. J. F. Brailsford: Bone Conditions Simulating Tuberculosis.

LEEDS GENERAL INFIRMARY.
TUESDAY, May 22nd.—3.30 P.M., Mr. Armitage: Demonstration of Surgical Cases.

GLASGOW POST-GRADUATE LECTURES.
WEDNESDAY, May 23rd.—4.15 P.M. (at the Western Infirmary), Mr. W. W. Galbraith: Urology.

Appointments

McSWEENEY, C. J., M.D., N.U.I., M.R.C.P.I., has been appointed Medical Superintendent of Cork-street Fever Hospital, Dublin.

NORRISH, R. E., F.R.C.S. Eng., Surgical Registrar at the Royal Northern Hospital.

Certifying Surgeons under the Factory and Workshop Acts: Camac, J., M.B., B.Ch. Belf. (Church Gresley, Derbyshire); MACCABE, J. E., M.D., Ch.B. Edin. (Loughton, Essex); OXLEY, P. M., L.R.C.P. Lond., M.R.C.S. (Bethnal Green).

Vacancies

For further information refer to the advertisement columns

All Saints' Hospital for Genito-Urinary Diseases, Austral-street, St. George's-road, S.E.—Res. H.S. At rate of £100.
Ashton-under-Lyne, District Infirmary.—Asst. Radiologist. £300.
Barnsley, Beckett Hospital and Dispensary.—Res. Surg. O. £300.
Bedford County Hospital.—First and Second H.S.'s. At rate of £165 and £140 respectively.
Belgrave Hospital for Children, Clapham-road, S.W.—H.S. At rate of £100.
Birmingham, Dudley-road Hospital.—Jun. M.O. At rate of £200.
Birmingham General Hospital.—Registrar to Throat and Ear Dept. £50.
Bristol City and County.—Asst. M.O.H. £500.
Bristol, Walker Dunbar Hospital, Clifton.—Two vacancies on Hon. Staff.
Burton-on-Trent, Breiby Hall Orthopædic Hospital.—Locum Res. Asst. M.O. At rate of £350.
Burton-on-Trent General Infirmary.—Cas. O. and H.P. £150.
Burma, Rangoon Municipal Corporation.—Health Officer. Rs. 1300.
Cambridge, Addenbrooke's Hospital.—H.P. At rate of £130.
Cardiff, Cefn Mably Hospital.—H.P. At rate of £100.
Central London Throat, Nose, and Ear Hospital, Gray's Inn-road, W.C.—Two Hon. Third Assts.
Chelsea Hospital for Women, Arthur-street, S.W.—Jun. H.S. At rate of £100.
City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E.—H.P. At rate of £100.
Cobham, Surrey, Schiff Home of Recovery.—Res. Surg. O. At rate of £200.
Dewsbury and District General Infirmary.—H.S. £150.
Dewsbury, Infectious Diseases Hospital.—Res. M.O. £200.
Eastbourne, Princess Alice Memorial Hospital.—Res. H.S. £150.
Elizabeth Garrett Anderson Hospital, Euston-road, N.W.—Jun. Asst. Path. £250. Also H.P., three H.S.'s, and Obstet. Asst. Each at rate of £50. Also Jun. Obstet. Surgeon.
Evelina Hospital for Sick Children, Southwark, S.E.—H.P. At rate of £120.
General Lying-in Hospital, York-road, S.E.—Jun. Res. M.O. and Anæsthetist. At rate of £100.
Hendon Isolation Hospital.—Res. M.O., &c. £500.
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—Asst. in Pathology Dept. £350.
Hospital for Sick Children, Great Ormond-street, W.C.—H.P. and H.S. Each at rate of £100.
Hospital for Women, Soho-square, W.—Res. M.O. At rate of £100.
Kent and Canterbury Hospital.—H.S. At rate of £125.
Lancaster Royal Infirmary.—Jun. H.S. £130.
Lincoln County Hospital.—Sen. H.S. At rate of £250.
Liverpool, Alder Hey Children's Hospital.—Res. Asst. M.O. £200.
Liverpool Women's Hospital, Catharine-street.—H.S. At rate of £100.
London Child Guidance Clinic, 1, Canonbury-place, Islington, N.—Two Fellowships. Each £300.
L.C.C.—Asst. M.O.'s in Mental Hospital Service.—Each £470.
London Fever Hospital, Liverpool-road, N.—Two Asst. Phys.
London Homœopathic Hospital, Great Ormond-street, W.C.—Res. M.O. £100.
London Hospital, E.—Hon. Clin. Asst. to Radiological Dept. Also Asst. Director of Med. Unit.
London Jewish Hospital, Stepney-green, E.—Out-patient Asst. £125.
London University.—Geoffrey Duveen Travelling Studentship. £450.
Manchester and Salford Hospital for Skin Diseases.—Asst. M.O. £100.
Manchester Babies' Hospital, Burnage-lane, Levenshulme.—Jun. Res. M.O. At rate of £50.
Manchester Royal Eye Hospital.—Jun. H.S. £120.
Miller General Hospital, Greenwich-road, S.E.—Cas. O., and Out-patient O. Each at rate of £150. Also H.P., and H.S. Each at rate of £100.
Northwood, Mount Vernon Hospital.—H.S. £150.
Penshurst, Cassel Hospital for Functional Nervous Disorders, Swaylands.—Med. Director. £1000.
Preston County Borough.—Asst. School M.O. £500.
Princess Beatrice Hospital, Earl's-court, S.W.—Clin. Asst. to X Ray Dept.
Princess Louise Kensington Hospital for Children, St. Quintin-avenue, N. Kensington, W.—H.P., and H.S. Each at rate of £100.
Queen Mary's Hospital for the East End, E.—Cas. O. At rate of £150. Also Two H.S.'s, H.P., Obstet. H.S., Res. Anæsthetist., and H.P. Each at rate of £120.
Rotherham Hospital.—H.P. £180.
R.A.M.C.—Commissions.
Royal Free Hospital, Grays Inn-road, W.C.—Res. Cas. O. At rate of £150. Also H.S. for Ear, Nose, and Throat Beds, and Res. Anæsthetist.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Hon. Clin. Asst. Also Hon. Phys.
St. Helen's Hospital.—Jun. H.S. £150.
St. Mark's Hospital for Cancer, &c., City-road, E.C.—At rate of £150.
St. Thomas's Hospital, S.E.—Chief Asst. to Dental Dept. Also Res. M.O.
Sheffield Children's Hospital.—H.P. At rate of £100.
South London Hospital for Women, Clapham Common, S.W.—H.P., and H.S. Each at rate of £100.
Stockport Infirmary.—H.S. £150.
Stoke-on-Trent, North Staffordshire Royal Infirmary.—H.S. for Ophth. and Aural Depts. At rate of £150.
Sunderland Royal Infirmary.—H.S. £140.
Swansea County Borough, Mental Hospital.—H.P. At rate of £100.
West End Hospital for Nervous Diseases, Gloucester Gate, N.W.—Hon. Asst. Radiologist.
Wimbledon Hospital Thurstan-road, S.W.—Res. M.O. At rate of £105.
Windsor, King Edward VII. Hospital.—Res. M.O. £200. Also Three H.S.'s. Each at rate of £100.
Wolverhampton, New Cross Hospital.—Asst. Res. M.O. £200.
Wolverhampton, Royal Hospital.—H.S. to Ear, Nose, and Throat Depts. At rate of £100.
York County Hospital.—Res. Anæsthetist and Asst. H.S. £150.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Haswell (Durham).

BROOKFIELD ORTHOPÆDIC CLINIC, WALTHAMSTOW. Last year 81 patients were admitted; their weekly cost was £2 4*s*., a drop of 6*s*. The income, £2665, left a surplus of £192. In the ten years of its existence the clinic has treated 584 children, and the report claims that as an institution for the care and cure of cripples it has "acquired and maintained a very high reputation in the country."

NOTES, COMMENTS, AND ABSTRACTS

NUTRITION

AN AGREED STATEMENT ON BASIC REQUIREMENTS

In its report on the minimum cost of a sufficient diet, issued last November, the British Medical Association's committee on nutrition adopted a scale of calories and first-class protein which was higher than that laid down by the committee which advises the Minister of Health. The difference gave rise to comment, and the Ministry issued a statement to local authorities stating that its committee saw no reason to modify the advice it had given (see THE LANCET, Jan. 13th, 1934, p. 87). The points at issue have since been discussed by a conference of representatives of the two committees,[1] and the following report has now been issued by the Ministry, signed by Sir Gowland Hopkins (chairman), Prof. Cathcart, Prof. Cowell, Dr. Crowden, Prof. Mellanby, and Prof. Mottram.

The Report

The business before the conference was to consider whether any important differences existed between the recommendations of the Ministry's Committee, as stated in their Memorandum "The Criticism and Improvement of Diets," and those of the British Medical Association's Committee, as outlined in their special Report on Nutrition, and if so, to determine the significance of such differences.

After examination of the position it became clear to the conference that the divergencies were more a matter of misunderstanding and misinterpretation than of actual fact.

In the first place it is desirable for a proper understanding of the position that the nature and objectives of the two Committees should be made clear.

The Ministry's Committee is a permanent advisory body first appointed in January, 1931, by the then Minister of Health, Mr. Arthur Greenwood. The duties of the Committee are to advise the Minister on the practical application of modern advances in knowledge of nutrition. The Committee consists of workers with a special knowledge of nutrition, who, as occasion demands, place their scientific knowledge at the disposal of the Minister and his staff to assist him and his department in administrative action. It does not possess any authority, nor does it attempt to give advice on economic matters. In their memorandum "The Criticism and Improvement of Diets," the Committee recommended 3000 calories and 37 grammes of first-class protein, or thereabouts, as adequate to supply the needs of the average "man" of the entire population of the country. *These recommendations were intended as a rough guide to medical officers of health so as to assist them in placing the nutrition of communities and institutions under their charge on a proper basis.* These values, being statistical averages, were meant to be applied to whole communities and not to individuals or even to single families. It is in this respect that the purpose of their recommendations differed most markedly from those published by the British Medical Association's Committee.

It is necessary also to point out that the responsibility for these and other recommendations made by the Advisory Committee belongs to the members of the Committee entirely and not to the Ministry of Health; and further, that in the above-quoted memorandum no recommendations of an economic nature were put forward.

The British Medical Association's Committee, on the other hand, is not a permanent body, but was a special ad hoc committee assembled for a specific purpose, "to determine the minimum weekly expenditure on foodstuffs which must be incurred by families of varying size if health and working capacity are to be maintained, and to construct specimen diets."

The terms of reference thus involved a task of a financial nature, but in order to discharge this the Committee had to decide on the food allowances necessary to maintain health and working capacity. In coming to a decision they thought naturally of unemployed men and their families and bore in mind that many unemployed spend a good deal of their time working on allotments, going to and from labour exchanges and places of employment in search of work, or else in keeping themselves in good physical condition by daily exercise in training centres. And since the food requirements of the individual depend on the amount of physical exercise taken, the Committee felt justified in recommending 3400 calories and 50 grammes of first-class protein per "man equivalent" as essential to maintain the health and working capacity of a family of this type. The Committee regarded these figures as sufficient to cover a wastage of 10 per cent., but did not suggest that they should be applied to the population as a whole or even to communities or institutions. It can thus be seen that, whereas the British Medical Association's Committee confined their attention to single active families, the Ministry's Committee had in view communities of people many of whom lead comparatively inactive lives.

CALORIES

The conference considers it important to emphasise the fact that nutrition and dietetics, dealing as they do with physical and chemical changes inside the body, most of which are imperfectly understood, cannot be considered exact sciences. The calorie is merely a convenient unit for measuring the energy-content of food and the energy-output of the body. Furthermore, it must be clearly recognised that owing to individual differences in physique, personal habits, likes and dislikes, and the variations in the degree of muscular effort involved in different occupations, it is not only impossible to define, but also there does not in fact exist, any standard of food requirement which can be rigidly applied to all men alike. If such a standard were defined and universally applied, it would at once be found that, while some individuals were satisfied, others would have either too much or too little. The amount of physical work, housing conditions, clothing, climate and personal characteristics are factors influencing the need and desire for food which have to be considered when dealing with individual men.

It appears, therefore, that a workable solution of the problem of physiologically desirable dietary standards for individuals can only be found in a sliding scale of calorie needs based on age, individual physique, occupation, and habits. On the other hand, in the case of mass calculations of the total food requirements of the population as a whole, where the question of distribution to individuals or purchasing by single families does not arise, or in the case of communal feeding, the difficulty of the standard ration being suited to the needs of each individual is largely overcome by the give and take in the food demands of the various individuals making up the community.

It is indeed a fact that, while certain limited classes of men need well above 3400 calories per day, others need less than 3000, and therefore the sliding scale of calorie needs now put forward by the conference has been constructed in the hope that it may provide authorities with a satisfactory working basis on which to determine the needs of individual men and families of varying composition. Such a sliding scale should not, however, be interpreted in too rigid a sense,

[1] The following members took part in the proceedings: Prof. E. P. Cathcart, M.D., F.R.S., Sir F. G. Hopkins, F.R.C.P., F.R.S., Prof. E. Mellanby, F.R.C.P., F.R.S. (representing the Minister's Advisory Committee); Prof. S. J. Cowell, M.R.C.P., Dr. G. P. Crowden, Prof. V. H. Mottram (representing the B.M.A. Committee); Dr. G. C. Anderson, and Dr. H. E. Magee (joint secretaries). The report is issued by the Ministry of Health and is obtainable from H.M. Stationery Office, price 2d.

for the unique nature of each individual's food requirements cannot be too strongly emphasised. The sliding scale adopted by the conference is shown below :—

SLIDING SCALE OF CALORIE REQUIREMENTS PER DAY

Individuals	Calories gross.	Individuals	Calories gross.
Man : heavy work	3400–4000	Child : 12–14	2800–3000
,, moderate work	3000–3400	,, 10–12	2300–2800
,, light work ..	2600–3000	,, 8–10	2000–2300
Woman : active work	2800–3000	,, 6–8	1700–2000
,, housewife	2600–2800	,, 3–6	1400–1700
Boy : 14–18 ..	3000–3400	,, 2–3	1100–1400
Girl : 14–18 ..	2800–3000	,, 1–2	900–1100

The conference also agrees that the all-round average requirements of the entire population or of large mixed groups of people at the present time is about 3000 calories per day. This figure can safely be employed for calculations of mass requirements, but, in the case of individuals, and single families, due regard should be paid to the sliding scale detailed above.

Of as great significance to health as calories are the proteins, minerals, and vitamins in the foodstuffs which go to build up the tissues of the body. Because of the special needs associated with the growth and development of new tissue, proteins, minerals, and vitamins are particularly important for children and expectant and nursing mothers.

PROTEINS

The general statements recited in regard to standards in respect of calorie requirements apply also to the needs of individuals, families, and communities for protein. Accumulated evidence indicates that the total daily need for protein per man unit probably lies between 80 and 100 grammes, that is, from 2⅘ to 3½ ounces. The precise amount of protein needed by any particular individual depends on physique, occupation, habits, personal tastes, and age, while climate appears also to be a factor of some importance. There is a general consensus of opinion that a certain proportion of the total protein should be in the form of first-class protein—i.e., protein of animal origin such as milk, eggs, cheese, meat, or fish. The desirable proportion of animal protein to total protein has, so far as our knowledge goes, never been exactly determined; but we are convinced from the evidence which is available that the growing child and the expectant and nursing mother require relatively large amounts of first-class protein, much more indeed than would be arrived at by simple calculation based on their man-value equivalents.

All recent studies on the nutrition of children have shown that milk is for them a most valuable food. It is indeed the only naturally balanced food we know of, containing as it does in readily available form not only first-class protein (18·7 grammes or ¾ oz. to the pint), but also minerals, vitamins, carbohydrate, and fat. The conference therefore desires to stress the importance of this highly nutritious food for the child and the nursing and expectant mother. Both the Ministry's Committee and the Committee of the British Medical Association were mindful of these facts in regard to the special needs of the child, and both stressed the importance for children of the provision and consumption of milk in adequate quantities.

In the case of the adult the conference is of the opinion that a diet to be reasonably adequate should always contain a proportion of protein of animal origin: and that on the basis of accepted dietaries, which have stood the test of practical experience, this proportion should not be lower than one-third of the total protein consumed, and may perhaps with advantage be increased to a half.

In applying these recommendations to individuals it must be remembered that in the case of both children and adults the foregoing statements are generalisations, which may well be qualified by individual tastes and variations, and, moreover, it should be pointed out that all proteins of animal origin do not necessarily possess the same nutritional value.

NO FUNDAMENTAL DISAGREEMENT

The members of the conference deplore the exaggerated importance which has been attached to the alleged disagreement between the two committees, and wish to avail themselves of this opportunity of stating that there did not exist, nor does there exist now, any fundamental disagreement on matters of scientific fact between the two bodies.

In conclusion it may be said that it is the earnest hope of the conference that these recommendations will prove of practical value to local authorities and others, and will enable them to place the nutrition of those under their charge both individually and collectively on a sound basis, in the interests of the health, fitness, and well-being of the nation.

PHOSPHORUS AND RICKETS IN SHEEP AND LAMBS

WHILST experimental work upon mineral deficiency in laboratory animals has been carried out for many years, the study of this deficiency in farm animals has developed comparatively recently. H. Müller (1873), F. Roloff (1866), and other early German workers realised the dietetic importance of phosphorus and calcium; their work, however, was overlooked and the subject of mineral metabolism was only reopened, on a serious scale, in the course of research work upon botulism. During experiments designed to establish the ætiology of "lamsiekte," a disease of cattle in South Africa, information rapidly accumulated regarding the influence of phosphorus upon the development and health of domestic animals. The history of the study of aphosphorosis in ruminants has been summarised [1] by Sir Arnold Theiler and Mr. H. H. Green, D.Sc. For many years it was considered that sheep, under natural conditions, did not suffer from mineral deficiency diseases; more recently it has been found in South Africa, Northern Europe, and elsewhere, that if the phosphorus deficiency is sufficiently severe osteomalacia does occur. Sir Charles Martin and Mr. A. W. Pierce, B.Sc., in a recent publication—the first of a series [2] entitled Studies on the Phosphorus Requirements of Sheep—describe experimental work carried out in Australia. A group of four ewes and five lambs were kept for eleven months on a diet adequate in proteins and vitamins, but containing only 0·6 g. of phosphorus per day, whilst control animals received 1·6 g. of phosphorus. It was found that the deficient group became fatigued rather rapidly, but, except for one lamb which developed clinical signs of rickets, the remainder showed no obvious differences from the controls. Analysis of the experimental data brought out the following facts. The consumption of bulky food (roughage) was considerably lower per head in the deficiency group than in the control group, whilst the gain in weight was 30–40 per cent. less. Blood analysis showed a striking fall in inorganic phosphate in the deficiency group, the fall commencing early in the experiment; the blood calcium was higher in the deficient group by the end of the experiment than in the controls. In general the foregoing findings confirm those of the South African workers. As regards wool production no appreciable difference was found in the quantity or quality of the wool from the lambs, whereas in South Africa deficiency resulted in the growth of a decreased quantity of very fine —i.e., thin fibre—wool; the S. African experiments, however, were carried out upon pregnant and lactating ewes suffering, in consequence, from a very severe mineral drain. The bones of the lambs in the deficiency group showed, at the end of the experiment, osteoporosis and to a lesser degree osteomalacia. One lamb developed typical rickets; a most interesting

[1] Nutrition Abstracts and Reviews, 1932, i., 359.
[2] Council for Scientific and Industrial Research, Commonwealth of Australia. Bulletin No. 77, pp. 44.

observation, for though there are a considerable number of reports of the occurrence of rickets in lambs, in comparatively few cases has the diagnosis been confirmed histologically. Also, this lamb lived under conditions very similar to nature, receiving adequate food (except phosphorus), vitamins, and sunlight, whereas most cases previously reported have been associated with an abnormal lack of sunlight.

LINES TO A G.P.

THE following lines in which neat versification blends wit and serious thought have been extracted, with thanks, from the April issue of the *St. Mary's Hospital Gazette*:

He's a general practitioner,
Sidesman and missioner,
And in addition a
First-rate physician, a
Man of decision, a
Great reconditioner.
By general admission a
Leading parishioner.

He's just a G.P.
With a minor degree,
And patients he'll see
At a very small fee.
But his slightest decree
Rules the whole family.
You can take it from me,
They daren't disagree.

He's the family adviser,
There's nobody wiser.
At birth or demise a
Successful deviser
And kind sympathiser.
Who could deny, Sir,
A gift from the sky, Sir,
To help you and I, Sir!

BOYS' CLUBS

HIS daily contact with a well-known Jewish Club—The Bernhard Baron Settlement—has given Mr. Henriques a unique opportunity for studying the personality of the young members of a large city, let loose after school and working hours in unattractive, insalubrious, and often mentally unsatisfactory surroundings. He has set out the results of his experience in a little book[1] full of interesting facts on club management, and still more interesting facts about club members, their mental attitude, aspirations, and difficulties. From the psychological point of view, the chapters on leadership, religion, and sex are the most outstanding. Perhaps in later and expanded editions more space will be given to these vital topics. But even in its present form this readable handbook ought to be in the hands of any physician whose work brings him into contact with social situations which throw a light upon neurosis and delinquency.

CONTRACEPTIVE METHODS

WE have received from Mr. Cecil C. B. Voge, Ph.D., B.Sc., F.R.S. Edin., a questionnaire directed to obtaining accurate information with regard to results of the methods employed in the use of contraceptives. Mr. Voge is, as some of our readers may know, the author of a book on the chemistry and physics of contraceptives in which the action of pure chemicals on the life of the spermatozoa is reviewed and in which much information with regard to proprietary contraceptive compounds is supplied. He has recently formed a museum in the department of public health of the London School of Hygiene and Tropical Medicine (vide THE LANCET, Jan. 21st, 1933) with the object of dealing with various aspects of a multi-sided subject.

The questionnaire on contraception consists of two forms, one for the medical profession and the other for lay persons. In form I. these pertinent questions are asked: the age on marriage of each patient, the number of pregnancies, miscarriages, abortions, or stillbirths, if a contraceptive method has been used and abandoned, and if abandoned, why? The practitioner is asked to state also the particular methods which he has recommended and which of them he prefers. In form II. the age on marriage of the subject is asked, the number of children living or dead, and the number of miscarriages and stillbirths, and details with regard to sexual life are invited; and it is inquired whether the employment of any birth control method has prevented pregnancy or borne any relation to sex satisfaction. If the reasons for failure of the method, the trade name of which should be supplied, can be ascertained, they should be given.

The forms can be obtained from "Consulting Chemist" 2, Gray's Inn-road, London, W.C.

[1] Club Leadership. By Basil L. Q. Henriques, M.A., J.P. London: Humphrey Milford, Oxford University Press. Pp. 200. 3s. 6d.

"CHINESE MEDICINE."—Messrs. H. K. Lewis inform us that the price of this book, by Dr. W. R. Morse, reviewed in our issue of May 5th (p. 962), is 7s. 6d.

Messrs. EDWARD ARNOLD & CO. write: "It has been pointed out to us by Dr. William Brown that certain phrases in our advertisements of the third edition of his book, 'Psychology and Psychotherapy' might be construed as being contrary to the accepted principles of medical ethics. In view of this we wish to make it clear that the responsibility for these advertisements rests entirely with us, and not with the author, who did not know of their contents until they were published. Future advertisements will be suitably modified."

LONDON HOSPITAL RESEARCHES.—Reprints of 31 of the papers published from the London Hospital last year are collected in a volume issued by Messrs. H. K. Lewis at 7s. 6d. Four are concerned with filtrable viruses (psittacosis and zoster), a subject in which investigation is actively pursued in the Freedom research laboratory by Dr. S. P. Bedson and his associates. Renal function in various of its aspects is considered in three papers, two of them from the medical unit, of which Prof. Arthur Ellis is director. Dr. Paul Fildes, F.R.S., and co-workers contribute four papers on the nutrition of bacteria; Dr. William Evans and Dr. Clifford Hoyle have reprints of two of their studies on the therapeutics of angina pectoris; and Dr. Hoyle is also author of three other papers, two of them on hypertension. Besides nine papers reproduced from our own columns the volume contains also Dr. Eric Skipper's review of diabetes mellitus in pregnancy, two of Dr. Dorothy Russell's contributions to the histology of cerebral tumours, and Mr. R. K. Debenham's analysis of 742 cases of hæmaturia.

Births, Marriages, and Deaths

BIRTHS

BARLOW.—On May 10th, at Welbeck-street, the wife of Surgeon-Commander N. A. H. Barlow, R.N., of a daughter.

CRAIG.—On May 4th, the wife of Dr. Nicholas Craig, Cheadle Hulme, Cheshire, of a son.

DYSON.—On May 10th, at St. Mawes, Cornwall, the wife of Malcolm Dyson, M.D., of a daughter.

FIDDIAN-GREEN.—On April 17th, at Matatiele, East Griqualand, South Africa, the wife of Dr. W. B. Fiddian-Green, of a son.

MACDONALD.—On May 7th, at Grosvenor-street, Edinburgh, the wife of James F. MacDonald, M.B., F.R.C.S.E., Northern Rhodesia, of a daughter.

SCHNEIDER.—On March 31st, at Southampton, to Dorothy, wife of Dr. J. E. Schneider—a daughter.

DEATHS

GREENE.—On May 12th, at Stratford-on-Avon, R. L. W. Greene, L.R.C.S., L.R.C.P., J.P., aged 81 years.

HALLEY.—On May 13th, at Fulham-road, S.W., William Halley, M.R.C.S., L.R.C.P., aged 71 years.

KIDD.—On May 12th, at Bransbury Mill, Barton Stacey, Francis Seymour (Frank) Kidd, Surgeon of Harley-street, W.

OGILVY.—On May 13th, at Long Grove House, Epsom, David Ogilvy, M.D.

PATERSON.—On May 11th, at Aigburth Hall-avenue, Liverpool, William Brogdon Paterson, M.B., C.M. Edin.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.